WESTERN GAS

April
1928

20 Cents
the Copy

This edifice, which is located at Wood and Harwood Streets, Dallas, Texas, is the general headquarters of the Lone Star Gas Company

CONGRESS DIV. SUBSCRIPTION

A MONTHLY JOURNAL DEVOTED TO THE
WESTERN GAS & APPLIANCE INDUSTRIES

The Type R

with Nordstrom Valve

Sealdport Lubrication

Designed to fill a need for a *Nordstrom Lubricated Valve* for less severe services than our standard valves, our Type R Valves are exceptionally low in price.

Equipped with our patented "Sealdport" type of lubrication which permits plug to be turned 360° without allowing line pressure to force lubricant out.

The valve shank indicates when valve is open or closed. No operation is necessary to seat or unseat the plug, except turning down the lubricant screw which performs the function of unseating, greasing and sealing the valve.

Especially desirable for Curb & Meter Service

Made with iron bodies and brass plugs. Recommended for services up to 100 lbs. air or water pressure or up to 50 lbs. gasoline or 25 lbs. gas pressure. The most efficient Valves for curb and meter service.

MERCO

TRADE MARK

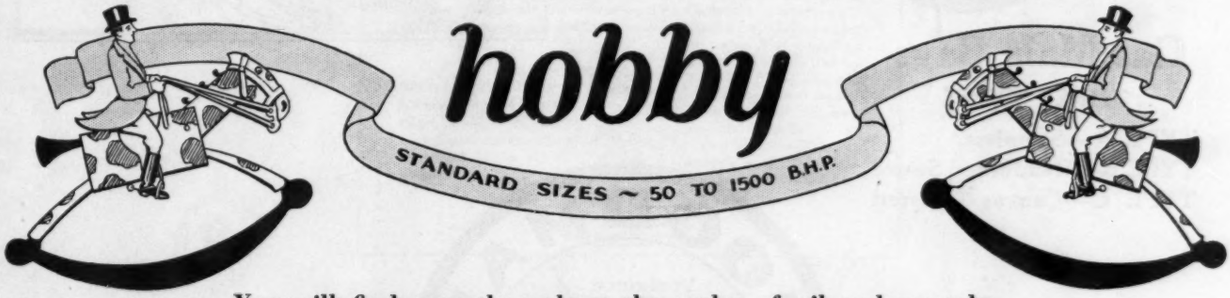
Merco Nordstrom Valve Co.

SUBSIDIARY OF THE MERRILL COMPANY

Engineers . . . . Manufacturers

SAN FRANCISCO, *121 Second St.* CHICAGO, *Peoples Gas Building*
CLEVELAND, *Engineers Building.* NEW YORK, *11 West 42nd St.*
NEW ORLEANS, *Masonic Temple Bldg.* HOUSTON, *Petroleum Bldg.*
Factories: Oakland, Calif., and Belleville, N. J. Agencies in principal cities.

For wealth and health it pays to ride the COOPER hobby

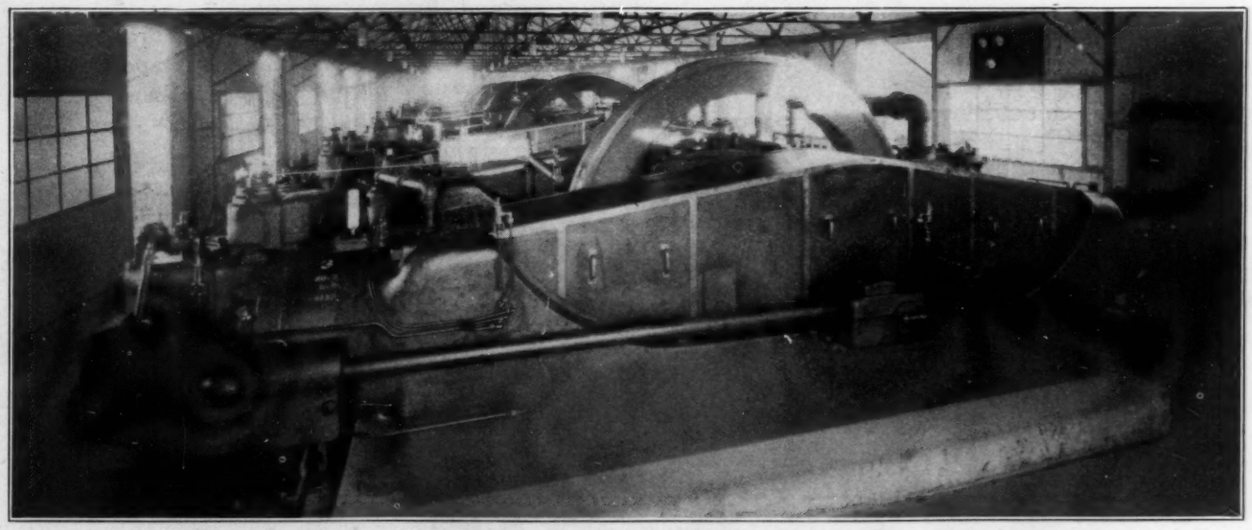


In many a natural gasline plant the economies resulting from operating Cooper engines very nearly represent the profit.

You will find men throughout the realm of oil and gas who have had the hobby of Cooper Engines and Compressors since they got their first job as engine room grooms. And, likewise, other men, who though never actually experienced in the operation of Coopers, have lived with engine performance, cost and up-keep records long enough to appreciate the better paces Coopers have shown them. To the men who have the Cooper hobby—and their number is growing at a great rate—Coopers are the Cost-Cutting Blue-Ribbon Champions.

A Cooper "cowboy" from any oil or gas state, can convince you that he's riding the best bet, in a long or short race, where the judges decide on the basis of leading efficiency, accessibility and operating satisfaction. If it suits you better to refer direct to the Cooper stables—we'll be glad to give you the latest dependable dope on how Cooper's will run for you.

Men live longer and happier if they can avoid worry. Every year more and more of them who have anything to do with gas engines and compressors choose "Coopers."



THE C. & G. COOPER COMPANY

Dallas, Texas **Mt. Vernon, Ohio** **Los Angeles, Calif.** **Tulsa, Okla.**

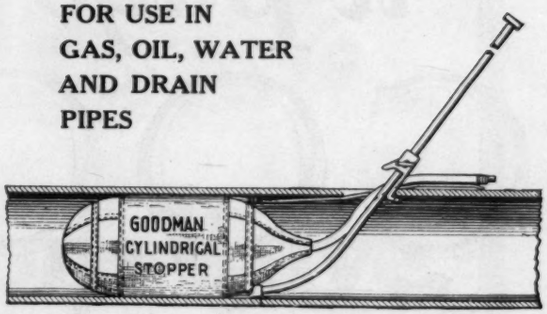
FOR SAFETY'S SAKE USE

Gas Main Bags

THREE TYPES

TYPE A—Seamless.
TYPE B—Reinforced Seams
TYPE C—Canvas Covered

FOR USE IN GAS, OIL, WATER AND DRAIN PIPES



Air Line Mask

With or without Blower.

Mask and Blower in separate cases.

Blower will supply sufficient air for 4 masks.

Safety Gas Main Soap Tape

For bandaging broken pipe. Also binding tape to cover soap tape bandage.

Safety Gas Main Stopper Co.

523 Atlantic Avenue, BROOKLYN, N. Y.

New England Representative
The Eastern Service Co., Boston, Mass.

Texas-Louisiana Representative
Maintenance Engineering Corp.
Box 1402, Houston, Texas

Pacific Coast Representative
C. B. Babcock Co., San Francisco, Calif.

Angel food cakes! easy to make

When grandmother made angel food cakes the recipes of her day were inaccurate. It took years to know her oven.

But today, when you accurately measure and mix ingredients you believe your cakes should always be good.

They will be, unless you're guessing at the oven temperature which is the chief cause of rubbery angel food cakes. They must be baked at 325 degrees.

An Oven Temperature Control

All the modern gas ranges have the Oven Temperature Control. It keeps the oven at exactly the temperature for which it is set. You place the angel food cake in the oven, set the Control for 325 degrees and leave the kitchen for an hour. The monotony of watching the baking vanishes. Meats, pies, and even a whole meal can also be baked with the same ease and freedom.

See the modern gas ranges with the Oven Temperature Control.

PACIFIC GAS AND ELECTRIC COMPANY

P·G·and E·

Owned · Operated · Managed by Californians

Reproduction of a 3 column 8 inch newspaper advertisement.

When you want to sell a quality gas range--

tell women the real reason for baking success

The real reason for baking success is not the quality of flour, the kind of shortening or the brand of canned milk. It's the oven. Baking must be done in a good oven. Like the ones on the better gas ranges. But more important still, baking must be done in the proper oven temperature. Ask any home-economist.

Women know how to measure and mix ingredients; manufacturers make good flour and other things that go into the making of food.

But the great story partly told is: "Proper Oven Temperature Makes Perfect Baking Easy." The best way to get the right oven temperature is with the Oven Temperature Control—a device on the better gas ranges.

That's the idea behind our newspaper advertisements this month, helping dealers sell quality merchandise.

PACIFIC GAS AND ELECTRIC COMPANY

P·G·and E·

Owned · Operated · Managed *by Californians*

Advantages of the "B" Meter

Meter conditions desired by the gas industry are found in the improved "B" Meter

INCREASED capacity without an abnormal increase in the actual running speed of the meter has been achieved. Actual and uniform enlargement of the valves and channels, necessary to produce given capacity increase, has been made while the speed ratio remains unchanged.

THE mechanical design has been improved. Additional strengthening to prevent undue wear and lost motion are other features of the modern "B" meter. Furthermore, the gas company obtains increased capacity per dollar of capital invested.

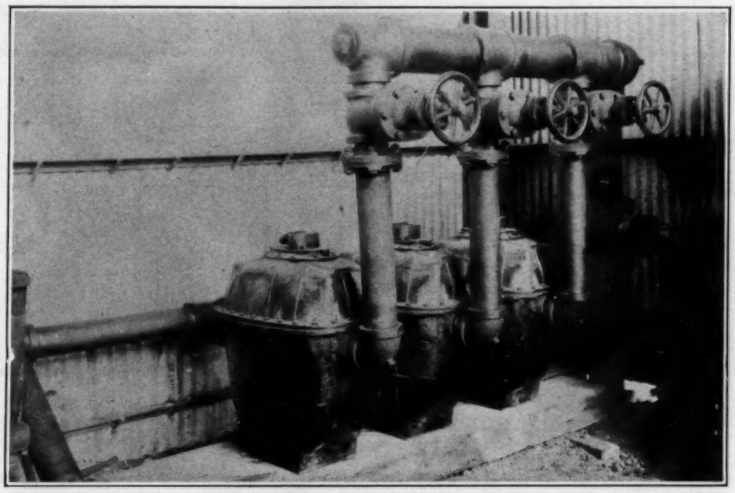
Pacific Meter Works

of the
American Meter Company, Inc.
Northwestern Representative

SAN FRANCISCO
495 Eleventh St.

PORTLAND
Northwestern Gas and Electric Equipment Co.

LOS ANGELES
2118 Atlantic St.



Industrial Gas Measurement with EMCO Large Capacity Meters

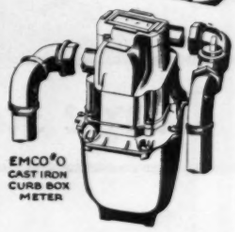
METERING in industrial installations can not be too carefully planned. A large amount of revenue depends on the meter accuracy. Troublesome and expensive interruptions of service must be eliminated. It is not surprising in view of this fact, that EMCO large capacity meters are used as standard equipment in industrial measurement by a large majority of the gas companies of the country.

The conditions under which industrial meters operate require ruggedness, ease of service and accessibility, the paramount features of EMCO Design.

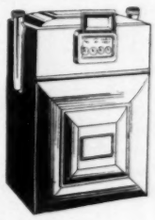
The above installation measures the gas to the forge plant of a Locomotive Works.

EMCO #0 CAST IRON DRY GAS METER

IRONCLAD CAST IRON DRY GAS METER

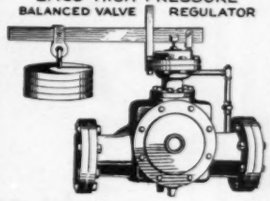


EMCO #0 CAST IRON CURB BOX METER

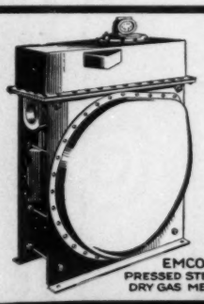


EMCO TIN METER

EMCO HIGH PRESSURE BALANCED VALVE REGULATOR



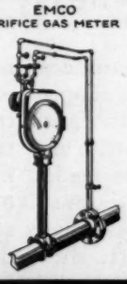
EMCO WATER HEATER AND GAS APPLIANCE REGULATOR



EMCO #5 PRESSED STEEL TYPE DRY GAS METER

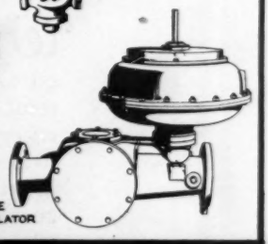
WESTINGHOUSE FLUID POSITIVE GAS METER

EMCO LARGE CAPACITY CAST CASE DRY GAS METER WITH EMCO COMBINED RECORD GAUGE



EMCO ORIFICE GAS METER

EMCO DOMESTIC SERVICE REGULATOR

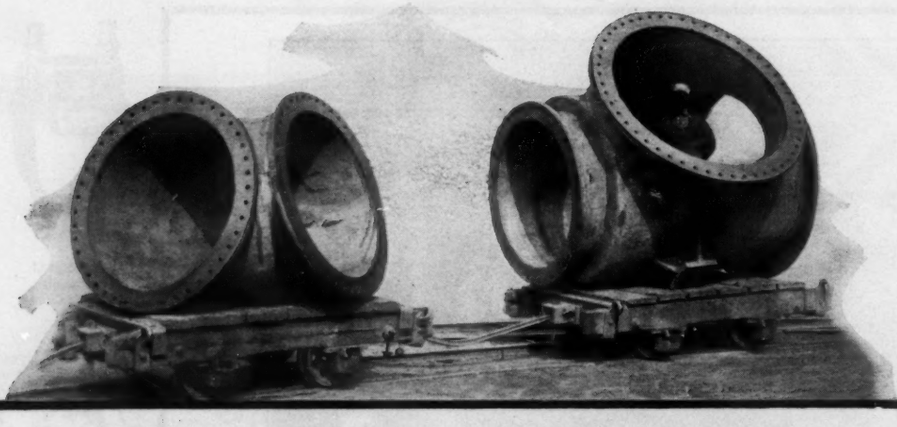


EMCO LOW PRESSURE BALANCED VALVE REGULATOR

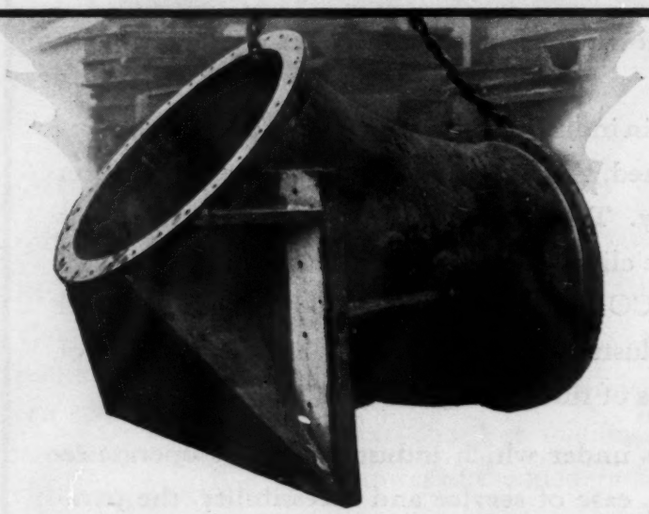
PITTSBURGH EQUITABLE METER COMPANY

MAIN OFFICE AND WORKS PITTSBURGH, PA.

NEW YORK CHICAGO COLUMBIA, S.C. LOS ANGELES DALLAS TULSA SEATTLE KANSAS CITY SALT LAKE CITY

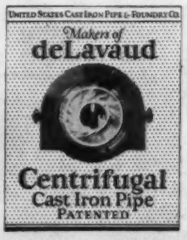


Large standard fittings and special castings



In our various plants we have unusual facilities for handling the largest standard fittings and for making especially heavy castings.

WHILE standard connections should be adopted as far as possible, it sometimes happens that an exception has to be made to meet unusual conditions. When such conditions arise communicate with our nearest sales office. Our equipment is so complete that oftentimes the castings can be designed to fit equipment already available at one of our plants. This saves the cost and lessens delivery time.



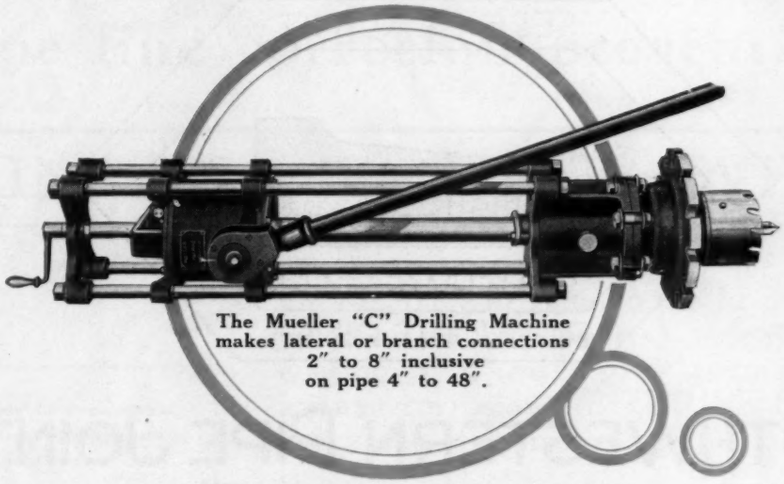
United States Cast Iron Pipe and Foundry Company

General Offices:
Burlington, New Jersey

SALES OFFICES

Philadelphia: 1421 Chestnut St.
Chicago: 122 So. Michigan Blvd.
Birmingham: 1st Ave. & 20th St.
Buffalo: 957 East Ferry Street
Cleveland: 1150 East 26th Street
New York: 71 Broadway
San Francisco: 3rd & Market Sts.
Pittsburgh: 6th & Smithfield Sts.
Dallas: Akard & Commerce Sts.
Kansas City: 13th & Locust Sts.
Minneapolis: 6th St. & Hennepin Ave.

THE MUELLER "C" DRILLING MACHINE



The Mueller "C" Drilling Machine makes lateral or branch connections 2" to 8" inclusive on pipe 4" to 48".

A quick clean job!

Profitable operation depends upon a quick clean job. The work must be satisfactory and done as quickly as possible. In the "C" Drilling Machine, Mueller has provided a quick, efficient and easy means for making lateral or branch connections to gas mains. The "C" machine gives the greatest possible handling ease without losing a bit of its working efficiency.

Lightness and strength is the result—a machine that two men handle easily, without straining, while one man can operate it if necessary.

With the careful attention to detail that is Mueller Quality, all working parts are encased in dustproof housings and run in heavy grease. The automatic feed prevents overfeeding the drill and one main shaft does for cuts of all sizes. The various sized drills are fitted on this shaft quickly and without difficulty.

Write for further details and prices.

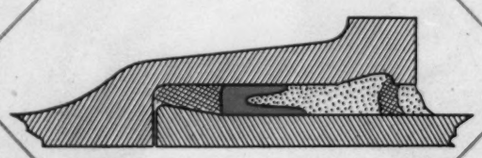
MUELLER CO. (Established 1857) **Decatur, Illinois**
San Francisco: 1072-76 Howard St. — 2468 Hunter St., Los Angeles — 111 McKinney St., Dallas.
Canadian Factory: MUELLER, Limited, Sarnia.

MUELLER

Make Your
Gas Joints
Self Healing

Sample Ring for Test
Furnished on Request.
– No Charge –

SELF HEALING

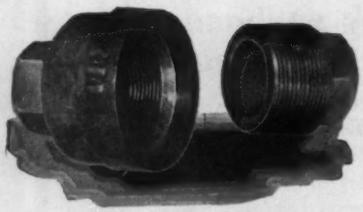


SOUTHWESTERN
PIPE JOINT RINGS

SOUTHWESTERN PIPE JOINT & ENGINEERING CO.

1108-1110 Fifth Avenue
BIRMINGHAM, ALABAMA

A New Day has come to cast iron pipe



Threaded ends McWane Screw-Joint gas pipe ready to screw together. The joint is even stronger than the pipe because there is extra metal thickness where the threads are cut, and it is leak proof.

The year 1927 was a most significant one for users of cast iron pipe. It saw the passing of the heavy, excess-weight pipe standards, and in their place the acceptance of types of stronger yet lighter pipe where the emphasis is placed upon QUALITY rather than mere quantity of iron.

WRITE FOR ILLUSTRATED LITERATURE

McWANE CAST IRON PIPE CO.
BIRMINGHAM, ALA.

PACIFIC STATES CAST IRON PIPE CO.
PROVO, UTAH.

SALES OFFICES IN PRINCIPAL CITIES

McWANE
CAST IRON PIPE

Here are the requirements of a permanent pipe line corrosion preventive

BITURINE ENAMEL MEETS EVERY ONE

A pipe line coating to permanently solve the corrosion problem must have these qualifications:

1. It must be waterproof.
2. It must be unaffected by soil acids and alkalies.
3. It must have good adhesive qualities.
4. It must not disintegrate with age.
5. It must be incapable of absorption by the soil in contact with it.
6. It must not be affected by underground temperature changes.
7. It must be a dialectric, in order to offer protecton against electrolysis.
8. It must be capable of practical and speedy application in the field.
9. It must be unaffected by ordinary handling in the field and not damaged by lowering pipe into the ditch.
10. It must be of substantial thickness.
11. It must be economical.

On this page are shown the 11 qualifications (decided upon by experts) essential in any pipe coating that will give permanent protection against corrosion. BITURINE ENAMEL fulfills every one of them.

For more than sixteen years many leading oil and gas industry executives have been successfully solving pipe line corrosion problems with Biturine Enamel—the permanent corrosion preventive. Hundreds of miles of pipe line have been coated with Biturine Enamel and operators have pronounced it entirely successful in giving permanent protection.

Unaffected by Acids, Alkalis or Electrolysis

Biturine Enamel is a heavy, quick-setting bituminous coating, tough but not brittle. It is applied hot and requires no wrapping. Adheres tightly to metal and will not crack. It is absolutely impervious to corrosive elements.

Biturine Enamel is manufactured by Hill, Hubbell & Company as one of a special line of paints for the oil industry.

No skilled labor necessary to apply Biturine Enamel.

Valuable, practical data and specifications furnished upon request.

HILL, HUBBELL & COMPANY

Manufacturers of
Highest Grade Oil Industry Paints and Pipe Line Coatings
Factories at SAN FRANCISCO and TULSA
District Offices:

SAN FRANCISCO · LOS ANGELES · PORTLAND · NEW YORK CITY
SEATTLE · TULSA · HOUSTON · BALTIMORE

READY!

The New and Finer

ROPER 900 *Series*

Today, Roper announces important refinements in the 900 Series of Roper Gas Ranges. Refinements that will bring an even greater public appreciation of Roper beauty. Note, on the range shown here, the absence of hinge boxes and visible door catches. Note, too, the grey enamel base band on this grey and white Roper. Get full details about this sales-winning Roper series. Write or wire.

Roper Colonial Design Color Ranges

BLUE . . RED . . YELLOW . . GREEN

are getting the greatest reception ever accorded a line of gas appliances. Draw the crowds to your store—speed replacement sales—get the newlywed business, by featuring Roper Color Ranges in your window now. Write or wire for the facts.

GEO. D. ROPER CORPORATION
Rockford, Illinois
Pacific Coast Branch: 135 Bluxome Street, San Francisco, Calif.

Roper Standard Gas Ranges are tested and approved by Good Housekeeping Institute and carry the Blue Star Seal of Approval of the American Gas Association Laboratory.

ROPER
TRADE MARK REG. U.S. PAT. OFF. REG. IN CANADA
GAS RANGES
GAS FURNACES

CAST IRON CONSTRUCTION

Legs, front frame, cooking top frame, door frames, end shelf, etc., are of cast iron construction.

BE SURE THE ROPER PURPLE LINE AND THE ROPER COMPLETE OVEN CONTROL ARE ON THE GAS RANGE YOU SELL

In the spring a woman's fancy

turns to beauty with more enthusiasm than ever.

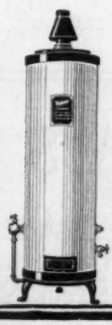
She is more interested in the "promenade deck" than the "galley". So, approach your water-heater prospects with the story of Hotzone as a beauty aid. Here you will find the least sales resistance. Furnish the gentle reminder that crystal-clear hot water is needed right at the tap if the proper attention is to be given to the skin and complexion. This is the fundamental selling idea that Welsbach has introduced with marked success. It is as modern as the Hotzone and as fundamental as its principles of operation.

The Welsbach Hotzone is made in four sizes: Fifteen, Twenty, Thirty and Forty-five gallons. The line is complete.

To tie in with this sales idea, Welsbach has prepared a series of newspaper advertisements which commercial managers can turn over to their advertising departments. Proofs and permission to run the advertisements as prepared will gladly be given. Write Welsbach Company, San Francisco Office, 863-865 Mission Street.

Member of American Gas Association
Member of Pacific Gas Association

Welsbach



HOTZONE

SELF ACTION GAS WATER HEATER

AN IDEAL GAS BOILER *for* EVERY *heating need!*

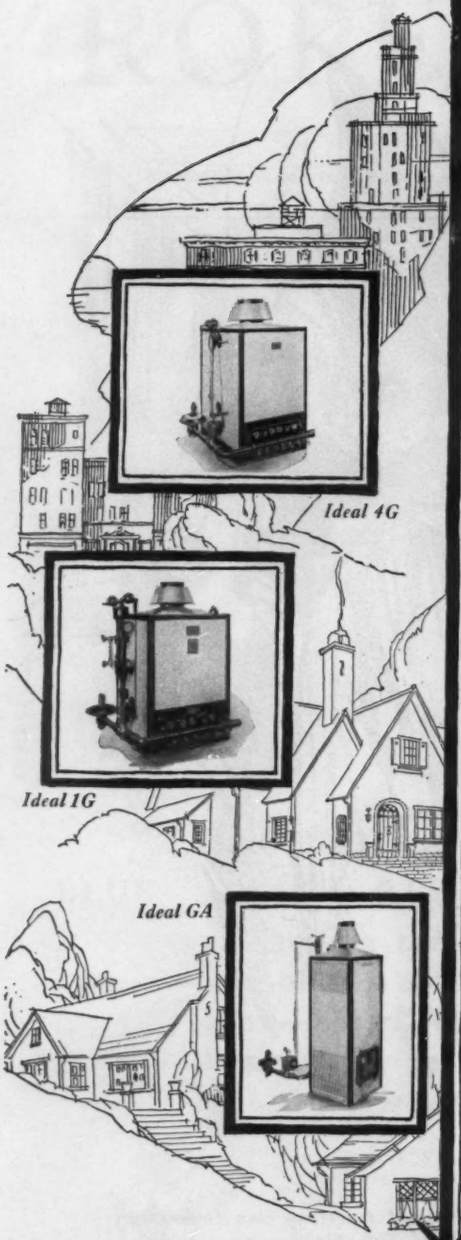
For cottages or bungalows—with or without basements—an Ideal Arcola Gas Heater!

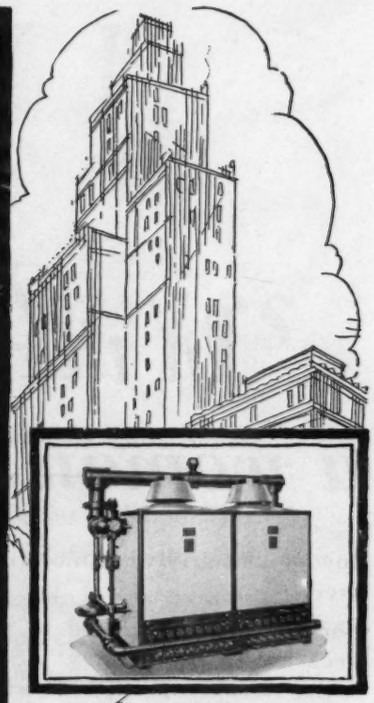
For small or medium-sized homes —Ideal 1G Gas Boiler!

For larger homes and buildings— Ideal 4G Gas Boiler!

For office buildings, big apartment houses, hotels — Ideal 4G Gas Boilers in multiple units!

All these boilers are useful for large-volume hot-water supply and industrial applications.





THIS whole family of perfectly-designed gas boilers offers you *exactly* the right heating plant for *every* job on which you want to figure.

Designed and manufactured by the American Radiator Company, it is the latest triumph of their boiler engineers.

Ideal Gas Boilers are made available to you without delay by strategically-located distribution centers.

We have prepared for you a plan book covering every detail of selling plans that actually *work*. Won't you send for this complete and practical information?

IDEAL GAS BOILERS

Product of AMERICAN RADIATOR COMPANY *Gas Utilization Dept.*

Write to AMERICAN GAS PRODUCTS CORPORATION, *Distributors*

376 Lafayette Street, New York City

WESTERN GAS

307 Thomas Building,
Dallas, Texas
Phone 2-8708

447 Sutter Street
San Francisco, Calif.
Phone GArfield 2772

Publication Office, 124 West Fourth Street
Los Angeles, Calif. Telephone TUcker 8982

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San Francisco Manager

CRAIG ESPY
Mid-Continent Manager

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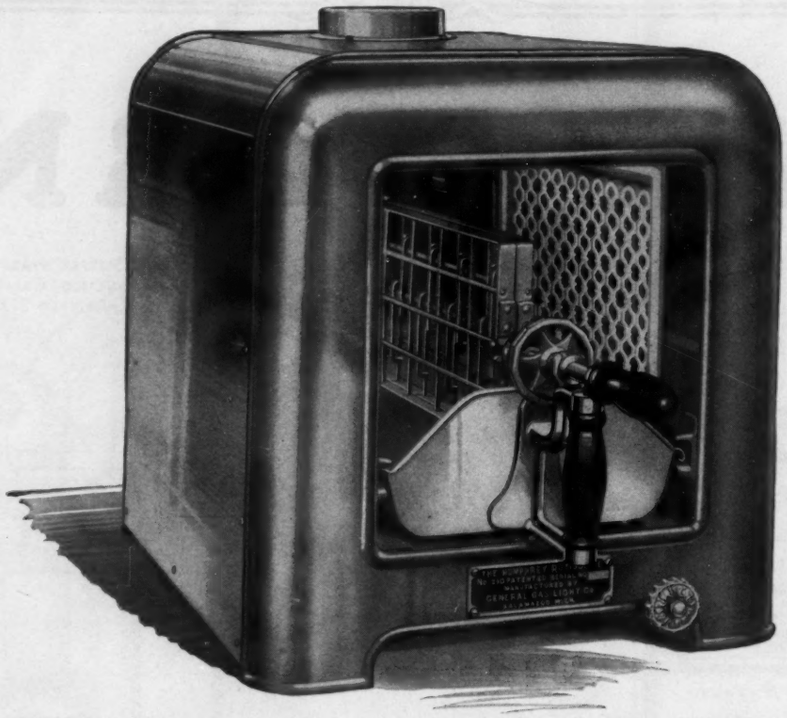

The Humphrey Rotisserie Broiler

The Rotisserie idea was handed down to us by primitive ancestors, but no method of cooking meats, fish or fowl has since been developed which equals it.

In the Humphrey Rotisserie Broiler there is the perfect combination of gas fuel and the famous Humphrey Super-Combustion burner. But the Humphrey Rotisserie Broiler is more than a method of cooking; it is a business-builder for restaurants, and a coaxer of appetites in hotels, clubs, and private residences.

It is priced to appeal to all of these markets.

The **HUMPHREY Rotisserie**

Manufactured by
General Gas Light Co.
Kalamazoo, Mich.

Pacific Coast Manager
C. B. Babcock
135 Bluxome St.,
San Francisco

WESTERN GAS

A Monthly Journal of the Gas, Gas Appliance and Natural Gasoline Industries in *Western America*

SAN FRANCISCO **LOS ANGELES** **DALLAS**

Industrial Gas Problems *in* Oklahoma

By JOHN S. ZINK

Industrial Gas Engineer, The Oklahoma Natural Gas Corporation
Tulsa, Oklahoma

AS RELATED in detail on another page of this issue, the Oklahoma Utilities Association met last month for its tenth annual convention, sessions being in Tulsa, Okla., March 13, 14 and 15. The paper offered on this page was presented by its author at the first of two afternoon group meetings held by the Gas Division of the association. In it will be found an interesting account of a large natural gas utility's experience in regaining and holding industrial gas load, a combination of low rates, aggressive selling, and consistent servicing enabling the gas industrial department to supply 90 per cent of all fuel requirements in towns served.

MANY chapters have been written on securing new load for the gas companies. In our case it was chiefly the getting back of industrial heating and power jobs that had fallen from gas due to the increasing cost of gas and the belief that the supply was not dependable. A large part of our prospects had tried gas and were convinced that, since the gas company had forced them to invest in oil burning equipment, it would be better for them to continue with some other fuel.

The oil salesman or some such person had the country believing that 6800 cu. ft. of gas were required to do the work of one barrel of oil. Our large consumers are mostly refineries and usually consider their cost of fuel oil the market price less freight and selling cost. We directly or indirectly were responsible for several comparative boiler tests between gas and oil. These tests gave results showing that from 5200 to 6000 cu. ft. of gas were equivalent to one barrel of oil. Firing gas and oil under 300 H.P. boilers in two entirely separate and unbiased tests indicated that 5200 to 5300 cu. ft. of gas were equivalent to one barrel of oil. The heat value of the gas was approximately 1050 B.t.u. per cu. ft.; the oil approximately 19,000 B.t.u. per pound.

On the large jobs such as stills and boilers of 300 H.P. and above, I am confident that it is correct to allow at least 10 per cent preference, gas over oil.

The prospective customer, convinced that he could burn as far as cost is concerned, doubted the dependability of our supply. This seemed to be most successfully met by pointing out that in most cases our investment to connect his plant was more than his for new equipment. We have continued to call on our larger consumers frequently, have been able to offer suggestions, lend meters, and change the pressure at which the gas was being delivered. This has brought about a better understanding between the company and the consumers. Even when fuel oil was quoted at 70c per barrel most of our refinery consumers burned gas throughout their plants at 15c per thousand cubic feet.

The smaller fuel users, laundries, bakeries, etc., came next. In case of this class user it was almost a case of "show me, I've been spoofed too much already about this gas." In most of these cases we found that the fault of poor gas service and misunderstanding was about equally divided between the consumer and the gas company. We were certain that, considering the convenience of gas over oil, our prospective gas consumer could burn gas at the rate then in effect. We immediately remedied the faults that were ours. Usually this required enlarging the supply line, the installation of new meters and in many cases, the extending of our intermediate pressure lines and the installation of a special regulator for that consumer. This always produced a favorable reaction on the new consumer and he usually followed our suggestions, bought new burners, on trial, and in general fixed up and repaired his boiler and boiler setting.

The next group of fuel users to be reconverted to gas were the downtown office buildings, churches, etc. This group represented perhaps the hardest job we had. While a few of the downtown buildings had remained on gas, the buildings that had changed to oil or had never used gas as fuel had a rather superior attitude to the gas burning buildings. Here, for the first time, we met

the argument that by burning oil they were helping the oil companies that filled their buildings. This line of reasoning had been given a great deal of publicity by the newspapers. We met this by explaining that most of the so-called oil companies were also producers of gas, and that by burning gas they were helping create a market for the oil companies' then worthless gas. We also pointed out that within the past year we had replaced a train load of fuel oil per day with gas. Formerly this oil was consumed, now it was shipped out to distant markets and brought money back to Tulsa and Oklahoma.

SEVERAL of the larger downtown buildings managers or owners meet together and talk over things in general. At last this group decided on gas. The majority of these buildings are on a gas line laid especially for the larger buildings. We carry six pounds pressure on this line. Each building has a regulator that steps the gas down to six or eight ounces and usually two meters, one for the boilers and one for the hot water heater, etc., that are used the year around. The smaller buildings, small laundries, apartments, etc., that were on oil or coal—and a few are still burning some fuel other than gas—also were very difficult to convert. The cost of fuel oil is so much per barrel. The small buildings bought oil at the same price as the large buildings; the cost of gas was more than oil, their fuel cost was a small matter and they could see no reason why they should spend money to increase their heating cost.

We kept in touch with this class, continually reminding them of the easy and trouble-free gas heat. The first time the oil burner gave trouble we usually had a call—"How soon could we have the gas in?"

When it comes to the use of gas engines for power we have been losing ground rather than gaining. This cannot be attributed to lack of effort but to low electric power rates combined with the simple and care free operation of the electric motor.

With the greatly improved direct connected gas engine driven generator, we have hope of regaining at least part of this load in the near future.

In connection with gas and gas service for new buildings and plants we write a letter to the owners and architects of all proposed buildings and plants, offering to co-operate with them in matters connected with the use of gas in their new project. This letter is usually followed with a personal call after an appointment has been made by telephone. The gas service is now such that owners, architects and plumbers are not considering any fuel other than gas for most of the new buildings, even with oil and coal at their present price.

The only class of consumer to be affected by cheap coal or oil has been the larger users of fuel who buy their gas at our low rate of 15c per thousand cubic feet.

We do not have exact comparative figures on fuel used in towns supplied by our company. We have the amount of gas, but not the amount of coal and oil. We estimate that, even counting the coke, sludge acid and other refuse consumed at refineries, 90 per cent of all fuel used in towns supplied by our company is gas.

I might add that fuel oil is quoted car load lots at 80c per barrel, and recently was down to 70c per barrel. We are selling 18 cent gas to one consumer who was firing slack or steam coal by hand, the cost of which was less than $2.00 per ton unloaded at his plant.

From experience I would roughly set the following comparative fuel values:

Large, well-engineered boiler plants:

6,000 cu. ft. of gas equals 1 barrel of oil
21,000 cu. ft of gas equals 1 ton of coal

H. T. T. boilers, stills, etc.:

5,000 cu. ft. of gas equals 1 barrel of oil
15,000 cu. ft. of gas equals 1 ton of coal

Small boilers and heating plants:

5,000 cu. ft. of gas equals 1 barrel of oil
11,000 cu. ft. of gas equals 1 ton of coal

Forges and blast furnaces:

5,000 cu. ft. of gas equals 1 barrel of oil

ALL drilling tools, swedge nipples, tubing catchers, etc., are heated in furnaces fired with gas. The owners and managers of these shops were of the opinion that oil was superior to gas for heating of steel to high temperatures. The common idea held by these men was that with gas too much time was required to bring the steel to temperature and that they experienced trouble with the formation of scale. With a CO_2 analyzer we set the mixture so that we had little or no free oxygen in the furnace. These furnaces are run at a temperature near 2400 degrees Fahrenheit, the same as when using oil. All the blast and annealing furnaces in our towns are now heated with gas. The highest temperature furnace that I know of in this district is a furnace used to bring steel nipples to welding temperature; 3500 degrees Fahrenheit, according to the shop foreman, is attained in this furnace. Pre-heated air is not used.

Pre-heated air is used in Oklahoma in several refineries and at two or three power plants and at all glass plants. The refineries and power plants preheat the air for combustion by passing the hot flue gases through tubes that are cooled by incoming air to the furnace. In glass plants a tunnel for each side of the glass vat leads to a common stack. These tunnels are filled with brick or tile baffles. For a period of 15 to 20 minutes the hot flue gases pass through one tunnel; the air for combustion is forced through the other tunnel. Then the damper is thrown and the tunnel formerly being heated by the flue gases is now used to preheat the incoming air and the tunnel just cooled by air is used to store the heat that would be otherwise wasted. The process is continually repeated every 15 or 20 minutes all the time that the plant is in operation.

THE most wasteful user of fuel in Oklahoma today is the zinc smelter. Some smelters burn 6,000,000 cubic feet per day and the only work accomplished by the heat is the distillation of a few tons of zinc. Practically all the heat is dissipated through the furnace walls or through the hundreds of small openings in the furnace walls.

There are burners and burners. Some give a blue flame fire, some a flameless or clear fire, and some a yellow flame fire, but assuming that enough of the right size burners are properly installed, all of the common burners can be operated to give the same results, when used under boilers or similar equipment. The type of burner is usually selected because of its operation more than for its fuel saving. I have either tested or witnessed tests on almost all types of gas burners and have found the chief difference between them is not in fuel economy but ease and safety of operation, with the power to produce large quantities of heat quickly, often in a limited fire box without pulsating or drumming.

This tendency for burning gas to pulsate, especially noticeable in small fire boxes, such as drilling fire box contained types or Scotch Marine Boilers, is little understood and very difficult to overcome.

While it possible to obtain the same or nearly the same efficiency with the various blue, clear, or yellow flame fires, we have found that with a yellow flame fire the operator can be taught to set his draft as accurately as can an engineer with a CO_2 analyzer.

The majority of the larger combination oil and gas burners throw the air for combustion into a swirl by means of blades set at an angle in the air passage. The swirling motion makes it possible to have a long flame with a short horizontal travel. This characteristic tends to burn the fuel in the front end of the fire box and consequently makes it possible to burn more fuel without flame impingement on the tubes. This type burner is better suited for the larger furnace and is usually manufactured

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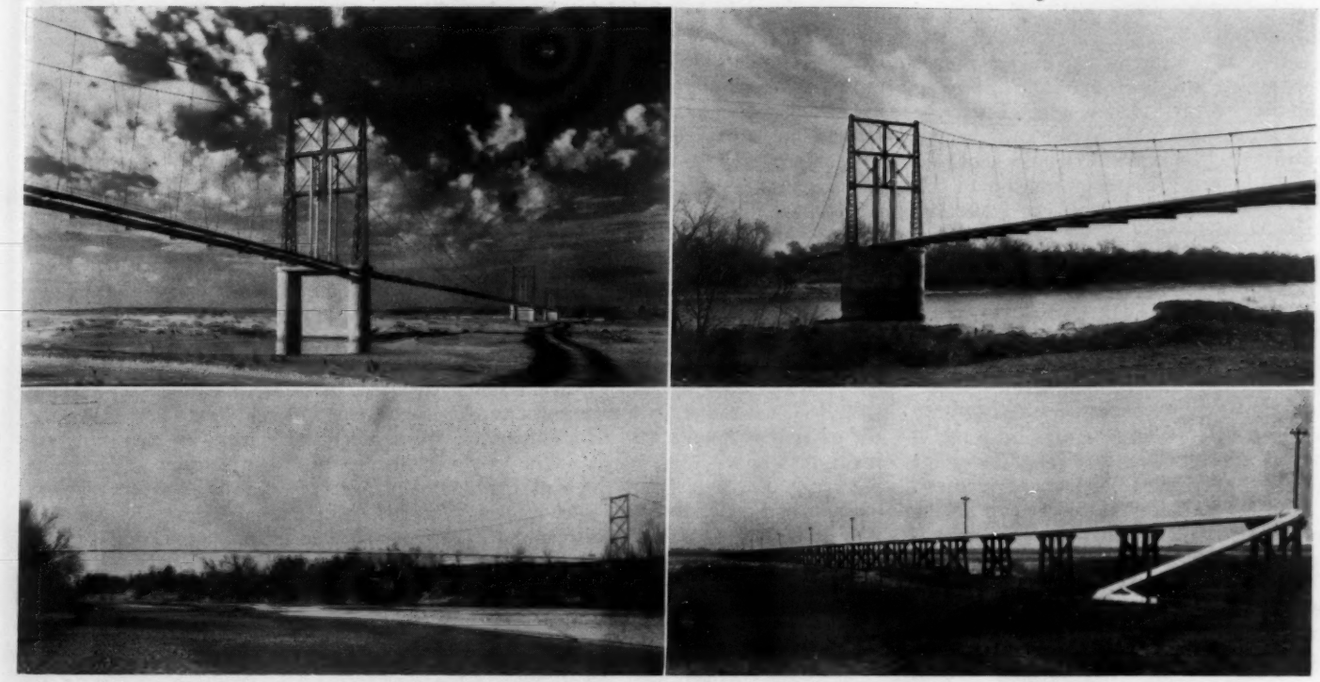


UPPER LEFT, Figure 1: Red River suspension bridge, near Byers, Texas. UPPER RIGHT, Figure 2: Suspension bridge across Brazos River, near Granbury, Texas. LOWER LEFT, Figure 3: Brazos River bridge, near Waco, Texas. LOWER RIGHT, Figure 4: Pile trestle bridge across Pease River, near Vernon, Texas

Pipe Line Bridges *on the* Lone Star Gas Company's System

By JULIAN L. FOSTER

Chief Engineer

Lone Star Gas Company

THE LONE STAR GAS COMPANY, after having experienced repeated breaks in lines across sand-bed rivers, which proved to be costly to repair, aside from crippling service on important main lines, adopted the policy of bridging streams whose beds were composed of quick sand. Possibly every reader has heard the story of cattle and horses, or even wagons and automobiles being swallowed up by treacherous quick sand beds. It might be well to state here that the quick sand beds do not except pipe lines in their destructive habits. They will quite often break them and bury them so they can never be recovered.

The Lone Star Gas Company found it necessary to lay pipe lines across sand bed rivers at six places, and it happened that each crossing was on a very important main line, which made it imperative that the crossings be made in such a manner that service would not be interrupted by washouts.

The question arose as to just what type of bridge would be most economically suited for the crossing at each location. The pile trestle bridge, the suspension bridge or swing bridge, and the pony truss bridge were the types considered, the pile trestle being the least expensive to construct.

The type of bridge to be used across each of the six sand bed rivers, at the point of pipe line crossing, was determined chiefly by the kind of formation underlying the quick sand, and the depth of the sand. It was obvious, of course, that a pile trestle could be constructed across a river where the sand is eight to 20 feet in depth, underlaid with a hard rock formation, as the piles would broom before they could be made to penetrate the rock, and the quick sand would not support the piles. If the underlying formation was clay, or even joint clay, piles could be driven into the formation sufficiently to be keyed tightly into the clay and withstand the shifting and crawling action of the sand around the piles. When the underlying formation was rock, it made a very satisfactory foundation for concrete piers to support either the suspension or pony truss type bridge. These concrete piers were constructed by sinking steel cylinders through the sand to the rock formation under the sand, pumping the sand out as the cylinders were lowered, with railroad rails doweled into the rock and left extending up into the cylinders. Then the concrete was poured, which gave a solid concrete pier securely tied to the rock foundation.

The lineal expansion of the pipe line, due to atmospheric temperature changes, had to be taken care of. Where the pipe line was laid on a suspension bridge, with stringers and floor system, it can readily be seen that the expansion of the pipe line would not be the same as the bridge stringers and cables, due to the difference in temperature of the gas inside the pipe line and the temperature of the bridge members. After much investigation of expansion joints of the stuffing box type (which on large lines, we believe would cause considerable leakage), and others,

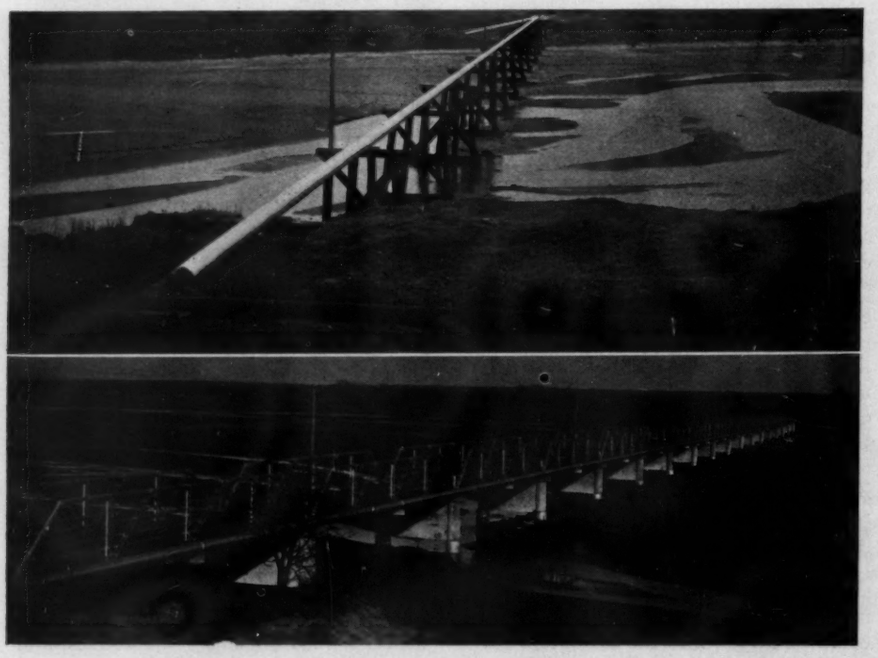
we decided to use a modified form of the old steam bend.

This was made by welding a square cornered "U" and rigidly reinforcing and bracing each corner, which forces the flexure to take place in the straight legs of the "U," which are usually about 40 feet in length. This expansion joint can be made to stand upright, in the vertical plane of the pipe line, or to lie at right angles to the pipe line, in the horizontal plane. This type of expansion joint has been in use by us for several years and we have never experienced the slightest bit of trouble with it. There has been no leakage whatsoever, and the contraction and expansion of the line has been satisfactorily taken care of. Both methods of constructing this expansion joint can be seen in the accompanying pictures.

Figure 1 shows the suspension bridge across the Red River, which is the boundary line between Texas and Oklahoma. This bridge is located near Byers, Texas, which is about 25 miles East of Wichita Falls, Texas. Careful soundings were made at this location and the sand was found to be from eight to 20 feet in depth, underlaid with a very hard sand rock, so it was decided to construct a suspension bridge at this location. The main piers of this bridge were made of two eight-foot diameter, five-sixteenths-inch thickness steel cylinders set on 30-foot centers, filled with concrete and doweled into the rock foundation as described before. The vertical cylindrical shafts were tied together by an 18-inch web wall extending from the ground line to top of pier. There are three main piers in this bridge, which average about 30 feet in height above the river bed, on top of which are two 60-foot steel towers, spaced on 30-foot centers. The main cables are 2¼-inch manufactured galvanized steel strand, carried on steel saddles which rest on rollers on top of the towers. The bridge floor beams are eight-inch I-beams spaced on 16-foot centers and are swung from the main cables by ⅞-inch round hanger rods provided with turnbuckles. Eight-inch I-beam stringers are bolted to the floor beams on 12-foot centers, which helps to stiffen the floor system. There are ⅞-inch lateral rods for cross-bracing between the floor beams to prevent side sway. There is one main pier in the center of the river and a 752-foot span to main piers near each bank. The rest piers are 376 feet from the end main piers. The concrete block anchorage is 80 feet from the south rest pier, and 186 feet from the north rest pier. The total length of this bridge, from anchor to anchor, is 2,522 feet, or approximately one-half mile long. This bridge carries two 12-inch solid welded lines on eight-foot centers, with expansion joints at each main pier. In the center of the bridge is a walkway made up of two three-inch by 12-inch timbers, spaced one inch apart, with guards on each side composed of two-inch pipe posts welded to the floor beams, with a three-eighths-inch cable threaded through the top of posts to form the hand rails. This bridge is painted a dark gray color and the pipe lines with aluminum paint which makes the appearance very attractive.

Figure 2 shows the suspension bridge across the Brazos River near Granbury, Texas. From the soundings made at this location, it was found that the quick sand was from six feet to 15 feet in depth, underlaid with a layer of gravel and soft clay about two to four feet in thickness, under which was a hard sand rock, so a suspension bridge was decided on for this crossing. This bridge is similar in detail to the Byers bridge, except that two and one-half inch main cables were used, as this bridge carries two 18-inch pipe lines instead of two 12-inch lines. This bridge is rather unusual in that it is two half spans instead of a full span. By the use of two half spans only one main pier was required, therefore, a considerable saving in construction cost was effected, as the main piers and towers are the most expensive parts of a suspension bridge. The main pier is in the middle of the river and the rest piers are on each bank 448 feet each way from the main pier. The concrete anchor on the east bank is 352 feet from the rest pier, the west concrete anchor is 331 feet from the rest pier, making the bridge a total length of 1580 feet. Expansion joints in the vertical planing pipe line were placed at the main pier.

Figure 3 shows the suspension bridge across the Brazos River near Waco, Texas. This bridge is approximately 85 miles down the river from the Granbury bridge. The soundings across the river at this location showed quick sand to be from 12 feet to 22 feet in depth, under which laid a gravel and clay mixture, which was rather soft and did not appear to be good material to drive piles into. Having been informed that pile trestles near this location had been washed out, we decided to put in a suspension bridge for this crossing. We did not need a walkway across the river at this point as it was at the end of the linewalkers' beats, so it was decided to use a lighter design for the bridge at this location. The bridge constructed here is strictly a pipe line bridge, as there is no floor system and no walkway, merely two one and one-half inch manufactured galvanized steel strand main cables, swung from 40-foot towers 20 feet wide, which were placed on concrete piers on each bank of the river, making a span of 440 feet between the piers. These piers are constructed of two five-foot diameter steel cylinders on 20-foot centers sunk to hard foundation and filled with concrete. One of these piers had to be sunk 45 feet from top of ground before proper foundation material was encountered. The concrete anchor on the north bank is 145 feet from the north tower, the concrete anchor on the south bank is 164 feet from the south tower, making the total length of bridge 749 feet. The pipe line, which is 16-inch solid welded, is supported by steel saddles which are swung from the main cables by seven-eighths-inch round hanger rods spaced on



UPPER, Figure 5: Pile trestle bridge across Salt Fork of Red River, 12 miles north of Hollis, Oklahoma. LOWER, Figure 6: Pony truss bridge across Red River, six miles south of Hollis

Figure 7: Air view of Red River, near Byers, Texas—Photo by Fairchild Aerial Survey, Inc.

20-foot centers. Storm cables one inch in diameter were placed around the outside of each pier and each saddle was tied to the storm cables to prevent side sway of the pipe. The expansion joint for this line is laid on the north bank adjacent to the north tower and is in the horizontal plane of the pipe line. This bridge, as well as the pipe line, is painted with aluminum paint which we have found to be very durable and also very attractive in appearance.

Figure 4 shows the pile trestle across the Pease River near Vernon, Texas. The soundings across the river at this location show the quick sand to be from 20 feet to 25 feet in depth, underlaid with a very hard, tight clay, or shale, as it is sometimes called. We knew that if we could get the piles to penetrate this hard clay, even for a comparatively short distance, that a pile trestle bridge would be satisfactory for this location. To make sure of having sufficient driving power to force the piles into the clay, it was agreed with the contractor that a No. 0 Vulcan Steam Hammer would be used in driving the piles for this bridge instead of the usual drop-hammer pile driver. Steel points had to be placed on all piles so they would enter this hard clay formation without brooming. The piles were driven to refusal, which varied from two and one-half feet to four feet into the clay. The piles used were creosoted peeled pine with minimum tip diameter of ten inches, varying in length from 40 to 45 feet. This bridge is composed of 58 panels of pile bents spaced 40 feet center to center, making total length of bridge, end to end, of 2320 feet. The pile bents are four piles each, ex-braced with three-inch by 10-inch timbers bolted to the piles and caps at each intersection and capped with a 10-inch by 12-inch by 10-foot cap. The height of cap is 10 feet above high water. Of the four piles in each bent, the two center piles were driven plumb, and the two outside piles were driven on a batter of approximately three-fourths inch to one foot in elevation. Each pile was drift bolted to the cap with a three-fourths-inch by 21-inch drift bolt. The caps and bracing were all of creosoted lumber. The pipe line, 18-inch solid-welded, was placed in the center of the trestle with scotch blocks on each side of the pipe line on each cap. Two expansion joints were placed in this crossing, one on each end of the bridge, one leg of which was used in getting out of the ground up onto the bridge, which can be seen in the right foreground of the picture, and these joints take care of expansion and contraction perfectly. This pipe is also painted with aluminum paint.

Figure 5 shows the pile trestle bridge across the Salt Fork of the Red River, about twelve miles north of Hollis, Oklahoma. This bridge is the same in detail as the Pease River bridge, and about the same hard clay formation was found under from one foot to 20 feet of quicksand in the river bed. This bridge is 480 feet long, carries one eighteen-inch solid-welded line, and has an expansion joint at each end of the bridge, one of which can be seen in the foreground of the picture.

Figure 6 shows the pony truss bridge across the Red River about six miles south of Hollis, Oklahoma. The soundings at this location showed solid rock outcropping on the south bank, the rock getting deeper towards the north bank. About the middle of the river the rock was below about 15 feet of quick sand and soft clay, and near the north bank, below about 25 feet of quick sand and soft clay, so that it can be seen that a pile trestle could not be satisfactorily built at this location. A suspension bridge was first decided on, but about the time the bridge was to be started, the people of Hollis, Oklahoma, started negotiations with the Lone Star Gas Company to build a combination highway and pipe line bridge. As the nearest highway bridge was about 20 miles away, it was decided that a toll bridge could be built at this location so the Hollis Bridge Company was organized and the pony truss combination highway and pipe line bridge was built. This bridge consists of eighteen 70-foot pony truss spans, and eight pile bents on 17-foot centers, for the north approach, making the total length of the bridge, from end to end, 1400 feet. The piers on which the pony trusses rest, are made up of 42-inch vertical concrete shafts, tied together with a nine-inch web wall and a 12-inch I-beam strut. In the middle of each span,

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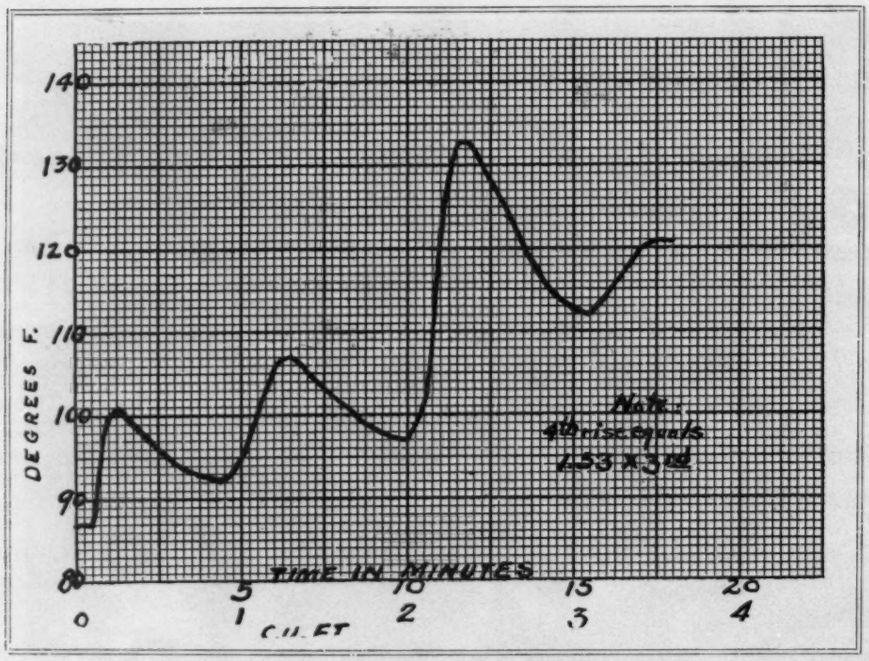


Figure 1

Curve shown at left reflects test using ¾" x 30" charcoal tube holding approximately 275 c.c., and indicates nature of the temperature rises observed on a 3.25 gallon gas at 6 cu. ft. per hr., test being cut at top of fourth temperature rise. Gas of different content should show a curve of similar trend.

Testing *for* Natural Gasoline Content

By E. H. PANN
Gas Engineer, Pan-American Petroleum Company

WITH the subject of gasoline content testing of natural gas of paramount importance at the present time, due in a large measure to the interest of the operators in establishing a common method whereby royalty tests shall be run in the same manner by all concerned, a consideration of the results obtained by different methods will show the difficulty of standardization. The best known methods of California operators will be considered below.

Of early methods perhaps the most spoken of is the Newton. The principle on which this method operated lay in the absorption of gasoline hydrocarbon by the so-called mineral seal oil, the absorption causing an increase in volume in the absorber. This increase is usually read directly in pints. We have here the advantage of speed, as the results are known by direct reading as soon as the test is completed. There were numerous disadvantages causing erratic results, such as gas absorption in the oil, difficulty in always obtaining the same absorption oil, error due to the small quantity of gasoline recovered, low result by reason of temperature of oil in the absorber, etc. The plant operator could usually count on running well over 100 per cent extraction by this test, even in the early days when plants lacked the present standard of efficiency.

Various other kinds of oil absorption tests have been tried in an endeavor to conduct testing in the same manner as the plant functions. Little success has resulted.

During the world war, charcoal was used very extensively for absorbing obnoxious and dangerous gases, and a great amount of knowledge was acquired in its use. Its adoption then as a method for absorping gasoline hydrocarbons was a matter of course, with a natural result of widespread use in testing gas for gasoline content.

Here again we have many roads to travel. Although charcoal has for some time been quite generally used in testing for content, the way it is used is so varied that comparable figures are not the usual result.

Some of the points of variance may be noted as follows:

1. Diameter and length of charcoal tube.
2. Method of gas measurement.
3. Point at which field test is ended.
4. Distillation method.
5. Interpretation of results.

Little need be said of the charcoal tube. Most of us agree that it is possible to get clear cut rises at desirable rates of the meter, obtaining good results from the test, by using ¾ inch x 30 inch tubes. This tube, then, is satisfactory.

The manner of measurement of the gas run into the charcoal has resolved itself into the use of a close reading positive displacement meter, or a miniature

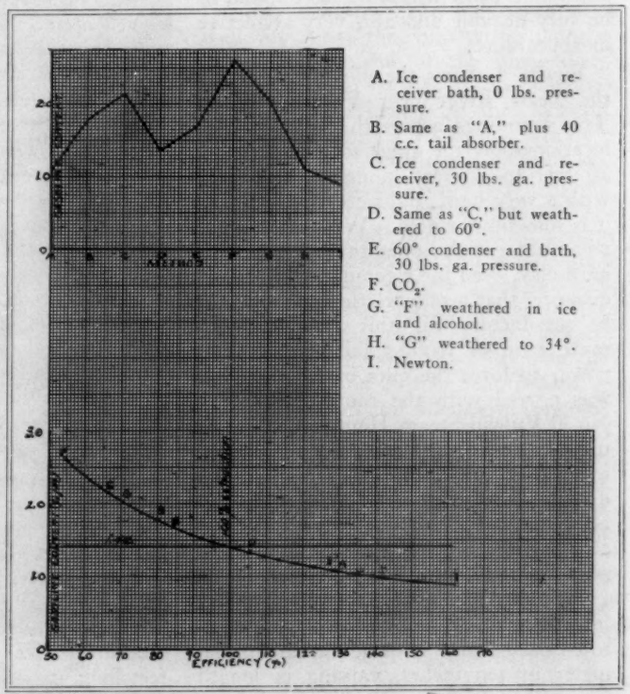

A. Ice condenser and receiver bath, 0 lbs. pressure.
B. Same as "A," plus 40 c.c. tail absorber.
C. Ice condenser and receiver, 30 lbs. ga. pressure.
D. Same as "C," but weathered to 60°.
E. 60° condenser and bath, 30 lbs. ga. pressure.
F. CO_2.
G. "F" weathered in ice and alcohol.
H. "G" weathered to 34°.
I. Newton.
EFFICIENCY (%)

Figure 2

orifice meter setup calibrated against a known source, for coefficient. The latter, being harder to control under heading conditions of wells, and under conditions of vacuum, and requiring a specific gravity of the gas at the time the test is run, is not as universally used as is the positive meter. Field usage is rather hard on the positive meter, which gets out of calibration, and requires quite frequent checking. Lack of proper checking equipment has been a common factor in measurement in the past. A combination of the several positive meters used into one, would make a good meter for this purpose. The difficulty now is that no meter is made specifically for this work. Either method of measurement is, however, satisfactory with the proper consideration of its limitations.

The point at which to stop the test in the field has differed materially. Whether to run for saturation, stop at the bottom of the third rise, or continue to the top of the fourth, or even further, seem to be the points of difference. Whichever is correct, or if all in themselves are correct for certain ends, a limitation to one method is necessary or results will never corrolate. Charcoal in good condition is very selective, and while the heavier series will replace a lighter series of hydrocarbons, by stopping at the fourth temperature rise on wet gas practically no condensible gasoline vapors escape. Four observations on four-gallon gas, showed a recovery of 0.06 gallons per thousand cubic feet each, by CO_2 test, on the gas venting from a ¾ inch x 30 inch tube of charcoal during the tests. Weathered to 0° F., all condensate weathered off. In order to illustrate the rises taking place in conducing a test in the manner indicated, figure 1 shows an actual run.

With charcoal adsorbing everything available, and assuming a stop at the top of the fourth rise, the result expressed in gallons per thousand cubic feet of gas, is dependent upon the manner of distillation, or recovery of the gasoline adsorbed by the charcoal. Distillation methods may be grouped as follows:

A. Iced condenser and receiver bath, receiver at atmospheric pressure.
B. Iced condenser and receiver as "A", with the addition of a tail vapor graduate containing various volumes of absorption oil.
C. Iced condenser and receiver holding 30 pounds gage pressure.
D. Ice condenser and bath as "C", but residue weathered to 60°.
E. 60° F. condenser and bath at 30 pounds gage.
F. CO_2.
G. CO_2 weathered in ice and alcohol, temperature around —5° F.
H. CO_2 weathered to 34° F.
I. Newton.

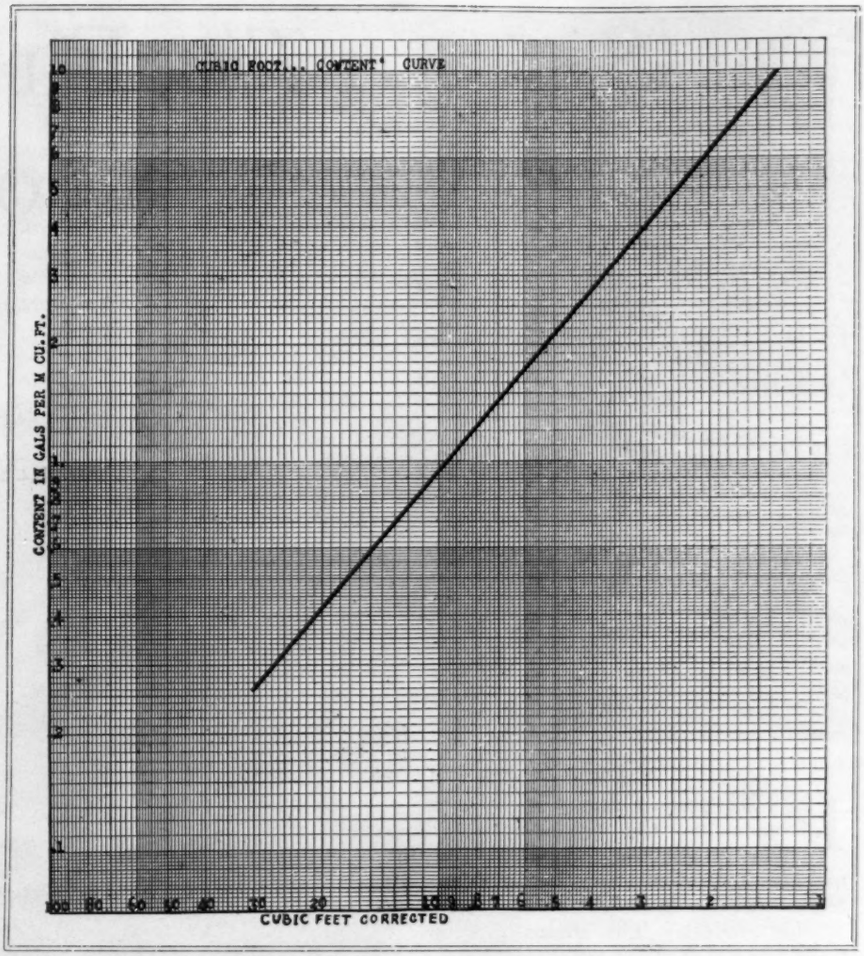


Figure 3

Taking a sample of an intake gas, the results are tabulated below. The efficiency is based upon the plant extraction of 1.42 for that day.

Method	G/M	Efficiency (%)
A.	1.09	130.0
B.	1.78	79.8
C.	2.15	66.0
D.	1.35	105.2
E.	1.69	84.0
F.	2.61	54.4
G.	2.04	69.6
H.	1.10	129.0
I.	0.88	162

Plotting these points as shown by figure 2, shows the variance clearly. An analysis of certain of these results will be pointed out. In the interpretation of results, the value of butane as a product of the output of a plant must be considered. Let us note that the plant under consideration would, without stabilization, make a product of 70-75 per cent recovery by the recognized standard casinghead gasoline distillation test. With a plant making stable gasoline without fractionating equipment, the apparent efficiency based upon the methods tabulated above, would change considerably. However the tendency is the same. Methods A and H would of course exclude all butane. The efficiency curve shows that the plant is extracting considerable butane. These methods would hardly be satisfactory for the distribution of the plant production among the several sources, due to this condition. Unless our test shows all normal butane, the possibility of further extraction cannot be ascertained.

Normal butane boils at about 33° F. at atmospheric pressure. Referring to C, the addition of 30 pounds pressure to the distillation brings the boiling point around that of propane. It shows the butane and heavier, the iso butane if present, and some propane. The latter two with high vapor pressures and bad knocking qualities are not desirable. This method then goes as far on the other side of plant extraction as A and H did below. Method E apparently shows the best in the present case. This is assuming that the best method of field testing, for royalty distribution, is one which shows all the possible desirable products which a plant will produce at

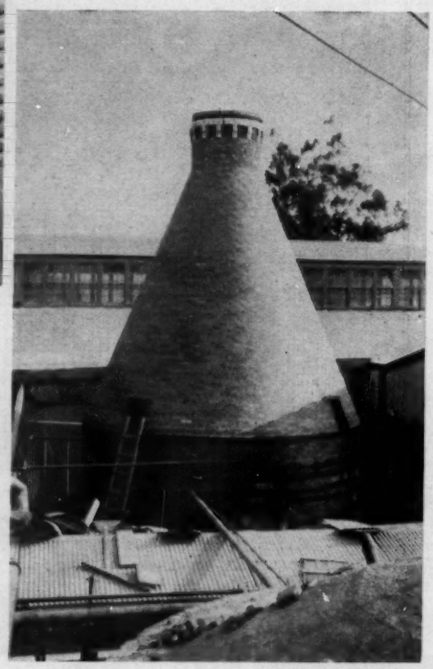
(Continued on Page 41)

The Firing *of* Decorative Tile

LEFT: Tile, after shaping, placed on drying pallets.

BELOW: Up-draft Beehive kiln burning gas fuel in the firing of decorative tile products.

By LEE HOLTZ
*Southern California Gas Company**



IN THE production and sale of any commodity, the producer is at times called upon to establish and maintain to the customers' satisfaction, certain meritorious facts that are claimed for his product. This means that in many cases he is compelled to go beyond the ordinary routine service that is usually rendered and by careful and intelligent analysis of the problem at hand, actually show the buyer that certain claimed inefficiencies are not always due to the fault of any one particular element involved but rather the failure of several elements to function properly in combination.

This statement is particularly true of any enterprise involving selling fuel, and especially so where the sale is for the purpose of firing delicate ceramic bodies such as terra-cotta, decorative tile, pottery, dishes, vitreous enamel ware, etc.

Owing to the fact that styles and patterns, as well as manufacturing processes, are continually changing to meet popular demand and competition, the manufacturers of these particular products are constantly confronted with many complex problems.

MUST CHECK ALL FACTORS

In almost every case of failure to produce first class ware, the fuel question is usually given first consideration for the reason that the firing operation is one of the most important factors in the entire manufacturing process and that approximately 75 per cent of the total cost of production is credited to the burning department. However, there are other factors such as kiln design, furnace and flue construction, and body and glazing materials that should receive an equal amount of consideration, inasmuch as all have a definite relation to each other in the operation and, for satisfactory results, must function properly together.

It becomes very necessary for all concerned to co-operate in so far as it is practical to do so and assist the manufacturer in placing the error where it rightfully belongs. Otherwise he may censure unjustly, which in turn only retards progress for every one involved.

Perhaps a better way to illustrate this problem would be to give a general description of the manufacture of tiles such as are used in our public buildings and homes for decorative and sanitary purposes.

The clay materials used for tile bodies are made up of many compositions, all depending upon the use of the finished product. The clay is prepared by grinding in a dry pan, after which it is screened and mixed. From this point, the clay is either handled in a very plastic state, having been put through a pug mill or used in a semi-dry state for machine pressed products.

Figured and many plain decorative tiles such as are used for mantles, fountains and certain classes of floors, are made from pugged clays that are properly aged to increase their plastic strength. The shaping is done by hand, either by pressing the clay into plaster molds or wire cutting after the clay slab has been smoothed down to the proper thickness. After shaping, the tiles are placed on drying pallets and removed to open air drying floors, steam driers or automatically controlled gas-fired humidity driers which very carefully dry the tiles so that no warping or breakage occurs. The drying time for small ware will run anywhere from eight hours to 50 hours, depending upon size and kind. For open air drying, the time will run from 3 to 6 days, depending upon weather conditions, size and kind.

Tiles such as are used for bath walls, floors and sinks are dry-pressed to insure uniformity of product, after which they are dried in the same manner as other tiles.

TWO FIRINGS

In most tile manufacture, two separate firings are necessary. The first, which takes place after drying, known as bisque, and the second, after the glazing material has been applied, is known as the glost firing. However, there are many mantle, wall and floor tiles that are not glazed, the color being cared for by the clay composition, and a definite firing schedule, such tiles being com-

*This is another (the seventh) of Mr. Holtz' excellent discussions on phases of the ceramic industry, in which he is not only giving *Western Gas* readers the benefit of his extensive experience with gas utilization as applied to firing ceramic products, but also is incorporating general facts apart from gas use which give insight into the problems an industrial sales engineer must meet in selling this tremendous load. Mantle, bath, and floor tile are particularly treated in this installment. The author is assistant superintendent of distribution for the Southern California Gas Company.—*Editor.*

pleted in one firing.

The tiles that are to be glazed are taken from the bisque kilns and thoroughly inspected before they are sent to the glazing room. Here the tiles are handled in several ways. Some tiles are hand dipped in either slip or raw glaze material. Others are sprayed with the aid of compressed air. Tiles that carry a design and are finished in one or more colors are decorated by hand, using a small rubber bulb which has a small bent tube attached. The bulb contains the glaze material and just fits the hand so that by pressing the bulb, the contents can be applied in a stream of uniform thickness to suit the requirements. This arrangement saves much time and is particularly adapted where several colors are to be applied to the piece.

TYPES OF KILNS USED

The principle types of kilns used for firing bisque and glost are the periodic round down draft, round up draft, rectangular, either with or without muffle and the direct fire car tunnel kiln.

The placing of the tile in the kiln prior to burning requires considerable care and a great deal of forethought is given to the matter of fire attack. As a means of protection, many tiles are placed in a boxlike container (made of a refractory material) about two feet square, four to eight inches deep and walls one-half inch in thickness. These containers are known as saggers and are placed in the kiln, one stacked over the other.

Many tiles are burned without the aid of saggers or muffle in both bisque and glost firing. In the event that the tile is to be fired only one time, the tiles are stacked one over the other, allowing ample space between for even distribution of heat. The firing of glazed pieces is usually done by the use of of saggers or muffle wall. However, in recent years a great deal of glazed ware, even to the most delicate finish, is burned quite successfully in the open fired tunnel kilns.

Bisque firing, where the regular down draft kilns are used, requires 84 to 150 hours' time to reach a temperature of 1900° F. to 2280° F., depending upon the class of tile. Glost firing in the same type of kiln requires from 1 to 3 days' time to reach the maximum temperature of 1850° F. to 1925° F., depending upon the nature of the product.

The firing of either bisque or glost ware in the use of direct fire tunnel kilns and burning to the same temperatures as above, requires 10 to 14 hours' time, depending upon the material and finish, and a saving of from 30 per cent to 50 per cent in fuel is claimed over the use of the periodic kilns.

It would be impossible to give detailed information on unit gas consumption in burning of tile products, in the space available, due to the many variations in quality and kind of product, and the wide range of processes involved.

The most common style of burner used for periodic kilns with or without muffle is of the atmospheric type. Recently premix and surface combustion installations have become very popular for periodic kilns and the use of muffle and saggers is considered unnecessary for many kinds of high grade ware.

For tunnel kiln work, the premix and surface combustion installations have been highly successful, due to the fact that temperatures are easily controlled and that the atmospheric condition of the kiln can be maintained uniform.

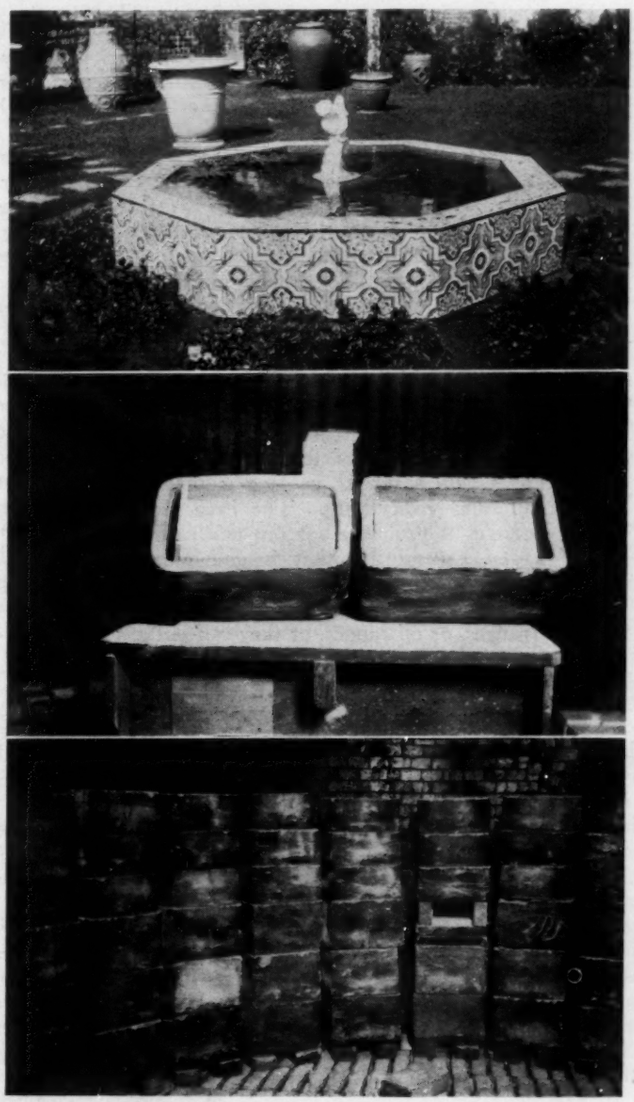
The main requisite for stable furnace conditions is even gas pressure and uniform air delivery with the gas. Frequently an attempt is made to use high pressure air at ten or twelve pounds pressure in combination with atmospheric burners, which is very poor practice and almost invariably will result in poor combustion and faulty production.

CLEAN AIR ESSENTIAL

Compressed air is sometimes very dirty due to inadequate cleaning devices, small receiving tanks, ill devised air intakes, etc. Even where it is used with surface combustion equipment, which is perhaps the most modern of all burning devices, condensation, iron oxide and other impurities so detrimental to delicate glazing materials are to be reckoned with if the air is not fairly dry and clean.

With the use of low pressure blowers, such as are used with premix systems and particularly in direct fire application, it is advisable to protect the air intake to the blower with a fine screen housing to prevent the possibility of dust and other impurities from being drawn in by the suction of the blower. Excessive lubrication about the blower is also very often detrimental in delicate glazed ware burning for the reason that the oil is not always completely consumed until after the half burned carbon particles have embedded themselves into the glazing material, causing imperfections in the finished product. The oil injected in this case is unlike that of

(Continued on Page 45)



TOP: This decorative tile fountain represents results achieved in gas-fired kilns.

CENTER: Tile placed in saggers prior to loading in kiln for firing.

BOTTOM: A flashlight view by the author, showing the loading of saggers in round down-draft kiln.

Selling *to* Build *the* Hotel *and* Restaurant Load

By F. U. NAYLOR
Manager of Gas Sales
*Pacific Gas and Electric Company**

IT MUST be obvious that in consideration of the problem of securing hotel and restaurant business the thing that we are interested in, the real objective, is gas revenues—not necessarily the selling of gas equipment.

Speaking of the home territory of the Pacific Gas and Electric Company, from the revenue standpoint we have recorded consumption which equals $1,400,000 a year from the gas that is sold to restaurants, hotels and similar institutions. That takes in about 3,000 consumers and amounts to a little over $400 per year per consumer—a good load factor and obviously an attractive piece of business for that reason.

FIRST SELL A SERVICE

In general, the problem cannot be considered as a mere sale of heavy duty gas ranges, or other gas equipment, in hotels or restaurants. The problem should be recognized as one of selling service with respect to the kitchen layout or kitchen plans.

In this connection consider the problem of selling the new job. The new job may be in charge of an architect or of the owner himself, but in either event someone is depended upon to lay out the kitchen so that there will be a maximum of efficiency in routine work conducted there. The hotel and restaurant equipment house that is selling the cutlery, dishes, and other odds and ends, will generally lay out the kitchen. However, it has been our experience that it is quite possible for the utility to do considerable effective work along that line by maintaining a competent kitchen-planning engineer to cooperate with such prospects in the best layout of their kitchen plans.

In old jobs we have found out that oftentimes it is very advantageous to rearrange the kitchen to make it more convenient to the chef. We have found instances where there are two coal ranges, back to back, and the chef has to walk in a circle to operate them. By removing them and putting up proper gas equipment it can be lined up so the chef can, with greater ease, perform his work.

So much for the general aspect of selling gas equipment. We must first of all sell some service with it or else we will not "get to first base."

There are two or three subdivisions of this problem that might be commented upon. First is the selling of the equipment to new jobs. By "new jobs" we mean a new hotel or hospital, a new school, a new club, or any institution where a regular kitchen is to be built. The idea that has been the basis of the activity in the Pacific Gas and Electric Company territory, at least, has been that of cooperation with the equipment houses who do sell hotel and restaurant equipment. At least, from our viewpoint, we feel that that is rather strategic in enabling us to capitalize on the resources and, oftentimes, upon the inside contact of the equipment house with the prospect in question. Also, it enables us to combat competition, of which there is a great deal.

The hotel and restaurant equipment houses lay out the kitchen plans. They sell all of the kitchen equipment; that means steam tables, dish-washing apparatus, all sorts of cooking equipment, utensils—everything. The item of the ranges is probably but one-tenth of the total expenditure that is going to be made for the complete equipment of the kitchen. Equipment firms can sell coal ranges, or oil ranges, or they can sell gas ranges. The gas company's job is to get them to sell gas ranges and therein is where we endeavor to cope with competition. With respect to new jobs, we have been very successful. Every new hotel, lodge, and institution of any importance has put in a gas kitchen. Last year we sold 236 jobs, representing over $136,000 added annual revenue to our company.

We endeavor to give every possible cooperation to the equipment houses in selling prospects gas burning equipment. Possibly the most important of all is the matter of service. A consumer who has an average annual revenue of $400 per year, or higher, certainly merits some form of special service from the utility—not a super-service, but periodical, systematic, voluntary service. By giving that we see to it that good equipment, properly installed, is kept in proper operation. That has been a big factor in aiding us to cooperate with the equipment house in its selling of gas equipment to new jobs.

The other aspect of this equipment house cooperation is that we have tried to get these firms to work on the thousands of consumers that are using oil and coal. We have tried to capitalize upon the fact that the equipment house often has this oil- or coal-using restaurant or hotel on its books from previous sale of equipment. We hoped to secure the desired result by initiating the idea of this prospect taking out oil or coal, and then turning the business to the equipment house to sell. But the equipment house will do no more than take orders on that basis, for we find that there is not a sufficient margin of profit to warrant them in going out and getting that business. Then too, it is rather a left-handed proposition for us to interest the prospect and turn him over to the equipment house to sell; especially where the equipment house has no particularly attractive proposition with respect to inducement or special terms to give such a prospect. That is one weakness in the carrying out of a policy of cooperation with the equipment houses too far.

The second phase of this problem of selling hotels and restaurants has to do with what we call "replacement and conversion," and there is a class of business we consider as a logical field for us to sell direct. These prospects are those who are using oil or coal equipment, or obsolete gas equipment. If the latter, they may have excessively high gas bills, and they may cost us too much to service them; also, they are ripe prospects for the oil man.

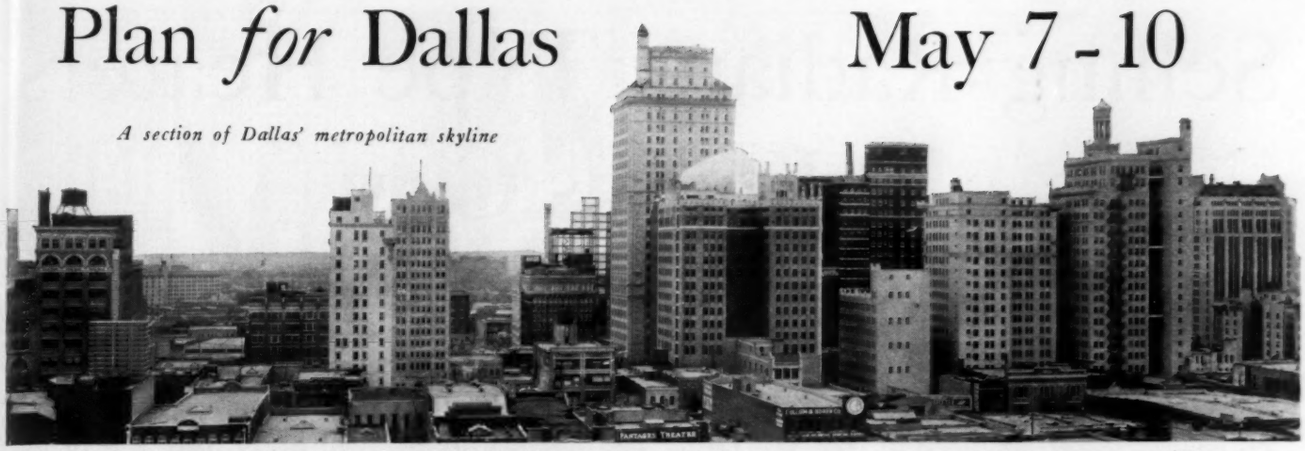
WHAT THE COMPETITOR SAYS

We have oil competition which oftentimes is presented to the prospect in this attractive guise: "You take out the gas ranges you are using and we will install oil ranges and the difference between what the gas bill was and what the oil bill is going to be, we will accept as our payments, month by month, until the new oil installation is paid for." That is *some* proposition; that is *some* competition! This should not be interpreted to mean that our gas is exorbitant in price, but there is a factor there that the prospect overlooks unless we happen to come along and point it out to him. That is, that he is not buying fuel; he is paying for what it is going to cost him to use it, and therein arises the necessity for what we call a complete unit cost analysis. For instance, considering the oil man,

(Continued on Page 47)

*Read at Pacific Coast Sales Conference held jointly by Pacific Coast Gas Association and American Gas Association, Los Angeles, February 24.

Plan *for* Dallas May 7 - 10



A section of Dallas' metropolitan skyline

Dallas Has No Latch Key

—*says* HENRY C. MORRIS

Vice President Dallas Gas Company
Chairman of Arrangements Committee

Henry C. Morris

WHEN Dallas gas men learned that the natural gas department of the American Gas Association was coming to Dallas, they at once induced the City Fathers to throw away the latch key, tear down the city walls, and put out a door mat.

So, fellow workers in the gas industry, we won't be able to turn over to you the keys of the city when you come. All we can do for you is to tell you the town's yours. Take it! You don't even need to wipe your shoes on the welcoming mat. Come right in!

Alladin rubbed his lamp and conjured up a slave to do his bidding. In Dallas we turn on a valve and get the same results, only better. Time is meant only for slaves, so when you come don't worry about the time. The only slaves in Dallas are electricity, the telephone, and natural gas.

I am not a bit modest I am not going to be backward in telling you that we are attempting to prepare for your entertainment that will be in keeping with this country of crystal clear atmosphere and vigorous progress, and one that will be fully up to the standard of traditions of Texas people.

We are going to entertain you as you want to be entertained and we also are going to give you some good information and some instructive thought in the convention sessions.

Just a parting word: If you miss the smoker on the night of Tuesday, May 8 at the Adolphus hotel—well, you might as well not come to the convention. That's all.

An Official Invitation

—*from* N. C. MCGOWEN

Chairman Natural Gas Department
American Gas Association

N. C. McGowen

THE Southwest invites, urges and will welcome every natural gas man in the United States and Canada who can get away from work, to attend the annual convention of the Natural Gas Department, American Gas Association, which meets this year in the very heart of the natural gas world—Dallas, Texas.

As head of the department, I believe I can officially speak for the natural gas industry of the Southwest in saying that we sincerely want you and honestly believe that your life will be incomplete if you do not visit the Southwest.

Living just across the border from the great state where the convention will be held, I am qualified by geographical position and by personal experience to extol the virtues and proclaim the wonders of the neighboring commonwealth, Texas—a state where the legendary eight-gallon hat has given place to industrial mastery and commercial leadership. This leadership, our guests will find, is based on natural gas.

It is therefore with considerable pride and with a tinge of pleasant anticipation of surprises awaiting our visitors, that I invite and welcome the entire industry to this our national convention

Reports indicate that the exhibits will be the most complete and the most numerous that we have ever had and the papers and speeches being arranged by the Papers Committee will be full of good information. Especially do I invite you to be prepared to join in the discussions of the many phases of our industry which will come to the fore.

Dallas and Texas are Ready

By CRAIG ESPY

Mid-Continent Manager
WESTERN GAS

A TRULY royal welcome awaits the natural gas man who has Dallas, Texas, as his destination on or about May 7th. And when he leaves, he'll say as did Irvin S. Cobb in a recent magazine article, "I sure like Texas."

No effort is being spared in laying proper groundwork for the Natural Gas Convention, which will draw men from all parts of the Nation to the Lone Star State and to Dallas for May 7th to 10th, inclusive.

All plans are now practically in order against the day of the approaching throng—for no less than a throng is expected. While no definite estimate can be given as to attendance, 26 leading hotels of the city have been asked to stand-by that the delegates may be adequately served. The city is in readiness in other respects also, due to the cooperation of the Chamber of Commerce with the Committee of Arrangements. of which Henry C. Morris, manager of the Dallas Gas Company, is chairman.

The Convention proper is to be held in the Fair Park Auditorium at the Texas State Fair Grounds, only a few minutes' ride from the downtown district. This building is ideally set up for a large convention and has successfully housed many. It has a total seating capacity of 5,000 and is only a few steps removed from the Manufacturers' Building, which will accommodate the exhibits.

The Exhibit Building has 95,000 square feet of floor area, which has been divided into more than 200 spaces for booths. Ample room has been left at the front of the building for registration desks, where Convention registration will be conducted, and at the rear

(Continued on Page 42)

Selling Radiant Type Heaters *at* Kansas City

By A. W. BAKER

New Business Manager
Kansas City Gas Company
Kansas City, Missouri

MR. BAKER'S paper published on this page was presented in connection with a symposium on auxiliary heating, which made one feature at the Second Midwest Regional Sales Conference, conducted by the commercial section of the American Gas Association in Chicago, February 15, 16 and 17.

The paper was designed merely as a review of how radiant type heater sales had been handled in Kansas City, Mo., during 1927, and the author wishes it exxpressly understood that his remarks do not carry a recommendation on how sales should be conducted in other localities for this type of appliance. The purpose of such meetings as this second sucessful Midwest Regional Sales Conference is to bring together methods which have succeeded under varying conditions and it was to this end that Mr. Baker's summary of methods found effective in his territory was intended to contribute.—EDITOR.

REASONABLY accurate surveys of our market for radiant heater sales at Kansas City indicate that by far the major portion of our customers are using gas for auxiliary heating and largely with radiant type heaters. A very large percentage of our total number of radiant heaters sold are replacements of radiant or less efficient room heaters, excepting those sold to new homes. In view of this situation, we are budgeting about 2700 heaters per year, and are selling about 2700 heaters per year.

We are merchandising this quantity of heaters at a substantial profit and should we continuously push the sale of this item higher, we would encounter reduced profits and eventually no profit and no net additional gas revenue of importance.

These sales and sales made by other dealers assure us that our customers are quite generally enjoying the use of modern efficient auxiliary heating equipment and are purchasing new equipment about as rapidly as is of any advantage to them or to our company. To sell more heaters, it would simply be necessary to devote more of the sales department's efforts to the sale of this item, supported by additional publicity.

By this I do not mean that the sales department results can be estimated as accurately as the production of a machine. A sales organization is too intensely human for that. But it is undoubtedly true that if a sales manager knows his market, has a time-tested sales force, and fits his sales plans to his situation, that he can make very accurate forecasts of results.

Our sales plan on Radiant Heaters in 1927 was about as follows:

SELECTION OF HEATERS

We continued to handle, as in previous years, one of the best constructed, most efficient, most widely known makes of heaters on the market, and in addition, a few inexpensive numbers of a standard make of heater. This gave us a very complete range of types and prices.

PUBLICITY

Publicity included a year-around sales floor display of all models, and during the fall, winter ,and spring months, two complete displays of all models.

Window displays were used intermittently during the fall and winter, and a direct-by-mail broadside to all single and two-family homes was prepared in advance and dropped into the mail with the first cool spell requiring the use of heating equipment.

Considerable space was used in local papers, starting about September 1st, reaching its peak in October, and gradually tapering off, very little space being used after the middle of December. We do not run spring campaigns.

Practically all of this publicity matter carried the very liberal terms of $1.00 per heater down and nine equal monthly payments on the balance.

MONTHLY QUOTAS

The salesmen's monthly quotas of radiant heaters were included with their quotas of other gas-using appliances, the size of the radiant heater quotas depending largely on the season of the year, with a larger quota during the fall and early winter, tapering off toward spring, and with practically no quotas of importance during the summer.

DIRECTION OF SALES FORCE

The sales floor force made an effort to interest customers in radiant heaters throughout the year, with special effort made at the season of the year when the need was felt most keenly for auxiliary heating equipment.

OUTSIDE REPRESENTATIVES

Outside representatives were expected to make their monthly quotas on radiant heaters the same as on other classes of gas-using equipment.

COMPENSATION

The salesmen were compensated for radiant heater sales the same as on other sales—a per cent of the selling prices as a commission.

Under our system of sales department operation we are always campaigning two or more classes of applicances at all times. Considering our general operations, it would not be desirable to use our entire domestic division for even a short period in the year on radiant heater sales only, as more important load holding and building operations, such as year-around house heating, would suffer.

We are not attempting to make record breaking sales of radiant heaters at Kansas City, but we do believe that we are maintaining a high average customer investment in auxiliary heating equipment and practically preventing and eliminating other fuels being used in any important way for auxiliary heating purposes, which, to us, is a satisfactory situation, and all that we are attempting to accomplish at the present time.

OKLAHOMA TOWNS VOTING ON GAS FRANCHISES

There is much current activity in extending gas service in Oklahoma. City authorities in Woodward, Alva, Fargo, Gage, Cherokee and Wyanoka, have adopted ordinances authorizing elections on franchises to the Winchester Oil and Gas Company, which represents the Knorpp interests. C. N. Haskell, representing the Oklahoma Oil and Utilities Corporation, is seeking gas franchises from Krebs, Haileyville, Hartshorne and Wilburton. J. T. Brickell, who owns gas production in the Sayre field, is seeking gas franchises in several western Oklahoma towns along the route of a proposed gas line to Enid.

Gas distribution has recently been established by the Oklahoma Natural Gas Corporation at Prague, the United Gas Service Company at Arnett, and the Allen Pipe Line Company at Francis. Lovell and Roxana have recently secured natural gas service from wells in the Logan county oil and gas area.

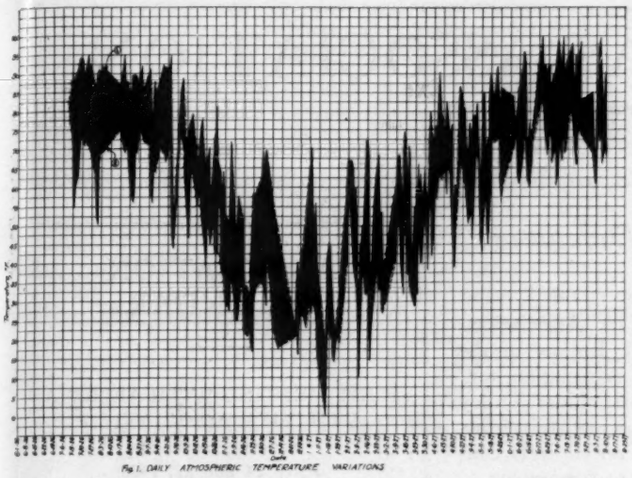


Fig. 1. DAILY ATMOSPHERIC TEMPERATURE VARIATIONS

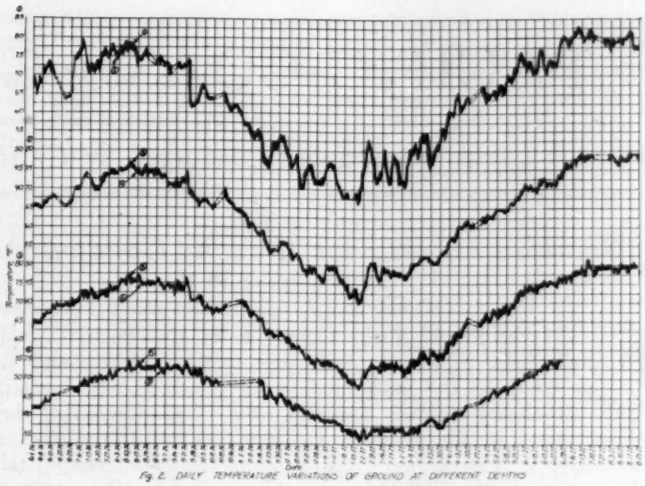


Fig. 2. DAILY TEMPERATURE VARIATIONS OF GROUND AT DIFFERENT DEPTHS

IN FIGURE 1 above, graph 1 indicates maximum daily temperature; 2, minimum daily temperature; ---, periods when daily observations were not obtained. IN FIGURE 2 above, 1 and 2 indicate maximum and minimum daily temperatures at depth of 1 foot; 3 and 4, at depth of 2 feet; 5 and 6, at depth of 3 feet; 7 and 8, at depth of 4 feet; ---, periods when daily observations were not obtained.

Bureau Tests Compare Ground Temperature *and* Atmospheric Temperature Fluctuation

By E. L. RAWLINS AND T. W. JOHNSON

United States Bureau of Mines, Department of Commerce

A PREVIOUS report[1] has explained that pipe lines for the transmission of natural gas should be buried to minimize temperature fluctuations because when excessive the latter decrease accuracy in measuring gas volume and increase leakage of gas due to expansion and contraction in the pipe joints. These effects are governed by the rapidity of the temperature fluctuations and by the total variations over a period of time. The temperature of gas flowing through a pipe line depends to a large extent, upon the temperature of the ground adjacent to the pipe; hence, fluctuation of the ground temperatures at various depths determines the economic depth at which pipe lines should be buried.

SCOPE AND PURPOSE OF REPORT

This report covers a record of the daily atmospheric temperature fluctuations at Bartlesville, Okla., for 12 months and a similar concurrent record of the temperature variation 1, 2, 3, and 4 feet below the surface of the ground.

It is hoped that the records will serve as a basis for estimating the depth at which a pipe line should be buried and for explaining measurement and operating difficulties in pipe-line operation that are affected by temperature fluctuations.

E. L. Rawlins

The ground temperatures were obtained by placing the external bulbs of recording thermometers in direct contact with the ground at the different depths. The thermometers for recording the atmospheric temperature were placed within a specially constructed louver house. All thermometers were of the external bulb type and had been calibrated against standardized mercurial thermometers.

The results of the tests are shown in figures 1 and 2.

Graphs 1 and 2, Figure 1, show respectively the maximum and minimum daily temperatures of the atmosphere. Graphs 1 and 2, 3 and 4, 5 and 6, and 7 and 8, Figure 2, show the maximum and minimum daily temperatures at depths of 1, 2, 3, and 4 feet, respectively.

As shown in Figure 1, there was a daily atmospheric variation ranging from 2 to 42° F. By calculation, the average daily variation was shown to be approximately 20°.

The maximum atmospheric temperature recorded during the period of the tests was 100° F., and the minimum temperature was 0° F.; hence there was a total temperature variation of 100° F. for the period of the tests.

The chart also shows that the atmospheric temperature fluctuations were very rapid. For instance, the maximum atmospheric temperature recorded September 23, 1926, was 95° F. The maximum atmospheric temperature recorded September 24, 1926, was 48° F. There was therefore a 47° change in the maximum temperatures from one day to the next. A comparison of the maximum temperature of one day with the minimum temperature of the day following shows a still greater variation. On the above dates this temperature span was 53° F.

Comparing atmospheric conditions with underground conditions indicated by the graphs in Figure 2 it is seen that temperature fluctuations are greatly reduced beneath the ground surface. Even at the shallow depth of 1 foot there were no excessively rapid fluctuations, as noted under atmospheric temperatures. Graphs

(Continued on Page 36)

*E. L. Rawlins is associate natural-gas engineer, and T. W. Johnson assistant natural-gas engineer, Bureau of Mines.

1. Rawlins, E. L., Fluctuations in the Temperature of Natural Gas Flowing in Buried and in Uncovered Pipe Lines: Serial No. 2771, Bureau of Mines, September, 1926.

PACIFIC COAST GAS ASSOCIATION

447 Sutter Street, San Francisco, California

A Department Conducted by Clifford Johnstone, Executive Secretary

Smokis to Dance for Arizona Convention Delegates

By MILTON G. SANDERS

Executive Secretary, Arizona Utilities Association

FROM the Smoki Snake Dance, a throwback to ancient civilization, to flying in the most modern of highly developed aircraft are the extremes found in the Arizona Utilities Association's Convention and Joint Meeting with the Pacific Coast Gas Association and the Pacific Coast Electrical Association, to be held at Prescott, Arizona, April 26, 27 and 28.

Because the Smoki Tribe does not care to deviate from its annual dance program it was not without some difficulty that the Entertainment Committee was able to persuade the Smokis to dance for the convention somewhat ahead of the annual dance, which will be held June 9th at Prescott, Arizona. The Smoki Snake Dance is nationally famous and this feature alone should draw many to the convention.

A modern five-passenger plane will be on hand for the three days of the convention. Among other hops, the plane will carry passengers from Phoenix to Prescott, and will take a party from Prescott to the Grand Canyon and return.

H. L. Masser and H. E. Davidson of the Pacific Coast Gas Association, W. L. Frost and J. G. Rollow of the Pacific Coast Electrical Association, and C. C. Cragin of the Salt River Valley Water Users' Association will give some highly interesting talks on subjects concerning the industries they represent.

All members of the Pacific Coast Gas Association and Pacific Coast Electrical Association are urged to attend if they are interested in constructive discussions of the Gas and Electric industries and interested in having a whale of a good time, according to W. C. Hornberger, president of the Arizona Utilities Association.

Any inquiries regarding the convention or reservations should be directed to "The Arizona Utilities Association, Phoenix, Arizona," or to "Mr. E. E. La Rue, The Arizona Power Company, Prescott, Arizona."

It has been suggested that those attending the convention from the Coast would do well to make connections with the Southern Pacific's Golden State Limited, leaving Los Angeles at 6:00 p. m. Wednesday, April 25. This will reach Phoenix at 6:00 a. m. Thursday, leave Phoenix for Prescott at 6:45, arriving at Prescott at 11:50 the same morning.

This unusual view, suggesting what those convention-bound will see at Prescott, shows a Smoki "doing his daily diet"—to quote Executive Secretary Sanders of the Arizona Utilities Association

ASSOCIATION CALENDAR

JOINT MEETING WITH ARIZONA UTILITIES ASSOCIATION
Prescott, Arizona
April 26 and 27, 1928

NORTHERN REGIONAL CONFERENCE
Vancouver, B. C.
June 6 and 7, 1928

35TH ANNUAL CONVENTION
Hotel Coronado, Coronado, Calif.
September 17-20, 1928

Unique Plan Being Tried *for* Vancouver Program

THOSE conventioneers who have been accustomed to sleep during the reading of long papers and those who claim to have heard nothing new at a convention in the last fifty years, will be stirred to interest by the letter below, which has been sent out recently from the Secretary's office to all members of the P. C. G. A. in the Pacific Northwest.

The letter speaks for itself, and while it is too early to predict whether or not it will achieve the results desired, it is a sincere effort to provide a real, worthwhile program for those who can attend the Regional Conference in Vancouver.

TO ASSOCIATION MEMBERS:

You may have noticed in *Western Gas* that the Annual Northern Conference of the Pacific Coast Association is scheduled this year for Vancouver, B. C., on June 6th and 7th.

We are finding from experience that the most interesting and valuable meetings are those which afford ample opportunity for the detailed discussion of practical problems. Many of us will travel long distances to attend the Vancouver conference and we do not wish to spend our time while there listening to a re-hash of time-worn topics, nor do we want to listen to long papers on subjects which cannot possibly interest us.

Therefore, in preparing this program, we must find out what interests the gas men in the Northwest. This letter is your opportunity to tell the program committee just what interests you most *now*. What ques-

tions are in your mind that you would like to ask, provided you know whom to ask and provided further that you could have a chat with him?

There is no limit to the number of questions and no restrictions as to their subject. White them out and send them to the Secretary at 447 Sutter Street, San Francisco, if possible before April 1st. Duplications will be eliminated, and the questions will be classified and published in the May number of *Western Gas* so that all Association members may have an opportunity to furnish answers. In addition, answers will be solicited by members of the program committee from those who ought to know. At the conference itself as much time as is needed will be devoted to these questions and answers.

Don't forget—we want questions and lots of them, and the tougher they are the sooner we should have them!

Very truly yours,

Clifford Johnstone

Executive Secretary

CJ:FI

P.S. Don't worry about the entertainment. John Keillor is going to provide that.

Merchandising *with a* Punch

By J. E. DAVIES

General Manager, Peoples Gas Stores, Inc.

*Chicago, Illinois**

THE Peoples Gas Stores, Inc., is a subsidiary of the Peoples Gas, Light & Coke Co. Distributed through the city are sixteen stores and offices. Business pertaining either to the gas company of the merchandising company can be transacted in each of them.

The primary function of the comselling it becomes necessary to create a market for the product. Therefore, the men in charge of merchandising should know the gas business. In order to increase the use of gas it is only natural that the company engage in pioneering work and it should not leave to others the responsibility of providing a market for the gas which it produces.

Our policy is to market quality merchandise which gives the utmost in gas service, combined with convenience and attractiveness. We think the gas company is looked to for the last word in efficient and economical gas burning appliances because that is our specialty and we should be recognized as the best authority in telling people how best they can use our product.

New uses for gas must be developed and promoted by the gas man. Dealers are in business for a profit and they can only market appliances which already have a public acceptance. A gas company cannot by itself market all the gas burning appliances which the market is able to absorb and, consequently, there is business for the dealers. We feel that these merchants are our associates and not our competitors. We only recognize as our competitors those industries which are seeking a portion of the public's dollar which should be ours.

In order to effect as wide a distribution of gas appliances as possible we must market our goods at a price which will permit profit-making by other merchants. The Peoples Gas Stores is the balance wheel on gas merchandising in the city of Chicago, but we feel that the more merchants we have working for us the better off we are. There are very definite advantages to be derived from this policy by both the Peoples Gas Stores and the merchants, as aggressive selling and productive advertising create a public demand.

In order to assure the selling of quality merchandise we lead the way by marketing those appliances which it is possible to service well. One obvious reason for this is to reduce service costs.

We did a merchandise business of three and one-half million dollars last year and such success as we had can be attributed to the cooperation of all departments of both the gas company and the merchandising company.

FLOOR AND WINDOW DISPLAY

The Peoples Gas Stores employs a trained staff to display its merchandise in a manner equal to that of our neighbors. Here we are in competition with the furrier, jeweler and haberdasher in seeking the attention of the passer-by. The importance of the windows to the merchandising arm of the public utility is so great that we must do everything in our power to at least equal our neighbor. If people pause and look in our windows the cost of maintaining this department is well spent.

In addition to displaying merchandise in our windows a card is placed on each appliance noting the cash price, the deferred payment price, amount of first payment and the amount and number of subsequent payments. These windows act as salesmen night and day.

We feel that the consumer's monthly visit to our store to pay the gas bill is not sufficient so we offer many special sales, mostly of things needed in the kitchen. We have one-day sales, dollar-down sales, seasonal sales, and in fact employ all the well known tricks to get people into the store. Even little things like toasters, corn-popers and coffee pots add a little to our load and they keep people using our gas.

We are going to capitalize on the colored range idea. We have started a Custom Built Stove Department just as the automobile people have custom built bodies. We deliver beautiful "Custom Built" ranges to the people of Chicago in about ten days after we receive their orders—after we have them "made"—and we will take ten days even though we have the range in the warehouse all the time. We are going to put the stove business on a higher plane.

ORGANIZATION

To obtain maximum results we have divided our sales organization into several groups such as house heating, water heating, refrigeration, and the Domestic Division. Each division has a manager and a sales crew. The Domestic Division takes charge of branch store business. In addition we have house-to-house salesmen working from our branch stores, reporting to a manager whose duty it is to build up sales of domestic appliances.

Under direction of the store management is a very important department known as the "Architects' and Builders' Section". This is a service section which is very beneficial to the gas company. This is the organization responsible for the Blue Star Plan. We not only know every architect in the city of Chicago, but one of our men knows him intimately. Each architect has in his file a folder containing full data on each and every kind of appliance. He knows all the piping regulations and every thing else about our business. The representative on our Architects' and Builders' Service Section is our ambassador at the court of that particular architect.

It is only recently that we woke up to the fact that the man who is determining how you and I shall live for the next twenty years is the man known as the speculative builder. We used to think he was a gambler and kept away from him. It was a mistake. These men are buying complete cooking, water-heating, house heating, fireplace heating, refrigeration and incineration units to go into the homes they build before they are offered for sale. That is the way our company is putting over the Blue Star. The cost of the equipment goes into the mortgage and the buyers have say, fifteen years to pay for it and during this time they are one hundred per cent gas users.

* An abstract of Mr. Davies' address delivered at the Pacific Coast Sales Conference

EDITORIAL

A Meeting of Outstanding Importance

MILLIONS of dollars, plus the highest type of engineering, have gone into the expansion of gas service in the past year in Mid-Continent and Southwest areas. Transmission line projects that, contemplated a decade ago, would have been considered fantastic, are now carrying a valuable natural fuel resource across state boundaries, and turning the wheels of industry several hundreds of miles from the source of gas supply.

Because so much of this activity has piled up within the past year or two, with only limited opportunity to exchange experiences within the industry, the near-at-hand convention of the American Gas Association's Natural Gas Department, at Dallas, Texas, takes on an unusual significence. Convention dates are May 7 to 10, inclusive.

Natural gas men have always turned out in force at their annual conventions, and the added interest, gained through location of the convention site in the heart of the Southwest this year, should produce a record crowd at Dallas. With long distance transmission daily becoming more accepted as good practice in the artificial gas branch of the industry there should be much of value to manufactured gas men as well as to those in strictly natural gas utilities, for whom the convention is of primary interest.

Changing Load Demands Change in Practice

NOTHING is certain for all time, even in so stable a field as that of the gas utility. This is seen vividly in the changing character of gas load—not referring to the hallowed transition from lighting to cooking,—but to the almost daily change in the character of demand upon our services. This might be expected on the lines of a natural gas utility, when additions to supply make possible the securing of new industrials at low rates, but changing load is just as perceptible in analysis of artificial gas sendouts, though the fluctuations may be less extreme.

Thus the Portland Gas and Coke Company, serving oil gas to Portland, Oregon, and vicinity, in 1927 dispensed 33 per cent of its gas for househeating, where 10 years ago but three per cent went to this class of load. Eighteen per cent of the sendout was for industrial consumers—practically double the industrial showing of a decade past. Meanwhile the company's lighting load has dropped to a negligible one per cent, from the 10 per cent figure of 1917.

No doubt but what these changes are typical, and the truth they impress upon the thoughtful utility man is that the industry needs its seers. Its leaders must forecast the future, for only to a limited extent can we check or modify general trends in changing load. This is not a discouraging fact. It merely points the vital necessity of keeping the industry's physical facilities and practices, as well as its rates and its sales structure, in line with changing conditions.

The Individual and the Association

IN THE face of the constant progress which is being made within the ranks of gas industry associations it perhaps seems beside the point to submit the following quotation from the pen of Merle Thorpe, which appeared recently in *Nation's Business.* However, though gas associations are almost without exception showing increased membership year by year, and are indulging in a widening range of committee activity, it does not always follow that the individual member is getting a maximum of good from his association affiliations, or that he is feeling the responsibility of returning his share of effort into association activity. These paragraphs, published under the head "Why Trade Associations?", bring the problem home to the individual:

> "There are many who profit from the work of their organizations, yet who glibly disavow any interest in group endeavor. Their disinterest ranges from apathy to antipathy. They 'haven't time,' or they 'make a contribution,' or declare that they'll have nothing to do with an organization 'which is run by a clique.'
>
> "Such men lose materially and spiritually. A New York banker said recently: 'The time is coming when a bank's committee will ask of the applicant for a loan: Is he a member of his trade association?' In other words, is he going it alone, trying to meet this intensive age without the help of his partners in industry?
>
> "Set this down as gospel: *The work of the world today is being done by groups.* Certain wastes are group wastes and can be eliminated only by a group program and group action. The individual, no matter how strong as an individual, is weak without the strength of his group. And the beauty of American organization is that individuality is stimulated, not suppressed.

If these sentiments are true for individual members of a competitive industry they are doubly true for gas companies, which among themselves are largely non-competitive and have everything to gain and nothing to lose from pooling their knowledge in association channels.

Oklahoma Utility Workers Assemble 1000 Strong *at* Tulsa

By CRAIG ESPY.
Mid Continent Manager
WESTERN GAS

ALL previous attendance records of the Oklahoma Utilities Association were broken in the tenth annual convention, held March 13th, 14th and 15th, at the Mayo Hotel, Tulsa. The previous high mark in attendance was last year's total of 800, but when the books were closed this year nearly 975 names had been entered.

The following officers were elected for the Oklahoma Utilities Association's leadership in the coming year:

I. W. Scherer, Yale, president; H. L. Montgomery, Bartlesville, first vice-president; T. H. Steffens, Sand Springs, second vice-president; W. R. Emerson, Oklahoma City, treasurer; E. F. McKay, Oklahoma City, manager. Mr. McKay has served in this capacity since 1923.

The Convention was divided into general meetings and divisional meetings. The former took place during the morning hours of the convention and most of the latter meetings were held in the afternoon from 1:30 to 5. Men of national repute addressed the morning sessions, while in the afternoon specific problems were discussed and in most instances the speaker's sections of these meetings were manned by Oklahoma men.

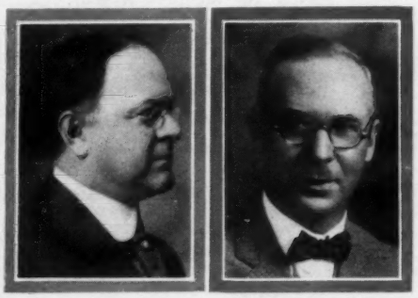
OUT OF STATE SPEAKERS

Among the speakers from out of the state, who had a prominent part on the three-day program were, John D. Liston, Schenectady, New York, engineer of the General Electric Company; J. W. Welch, New York, general secretary of the American Electric Railway Association; C. C. Deering, Chicago, secretary United States Independent Telephone Association; Alexander Forward, New York, managing director, American Gas Association; Paul S. Clapp, New York, managing director, National Electric Light Association; W. S. Vivian, Chicago, director public relations, Middle West Utilities Company; H. S. Bennion, New York, director of engineering, National Electric Light Association; E. K. Hall, New York, vice-president, American Telephone & Telegraph Company; Miss Anne Barnes, Des Moines, Iowa, representative United States Independent Telephone Association; Samuel A. Chase, Mansfield, Ohio, special representative Westinghouse Electric and Manufacturing Company; and Honorable Charles A. Eaton, North Plainfield, New Jersey, Representative in Congress.

The first general meeting of the convention was opened at 9:45 Tuesday morning in the Crystal Ball Room of the Mayo Hotel, and was presided over by E. R. Ernsberger, president. Among others taking part in this meeting were C. W. Kerr, D. D., Tulsa, pastor of the First Presbyterian Church, H. F. Newblock, mayor of Tulsa; E. F. McKay, Oklahoma City, manager of the Association, and W. R. Emerson, treasurer. Honorable Henry S. Johnson, Governor of Oklahoma from his Oklahoma offices delivered a long distance address, heard by the convention delegates through a two-way set-up provided by the Southwestern Bell Telephone Company.

Notable among the afternoon Divisional Meetings were those of the Public Relations Division and the Gas Division.

Keith Clevenger, Bartlesville, director of public relations for the Empire Companies, presided as chairman of the Public Relations Division, and appearing on his program were W. S. Vivian, Chicago, director public relations, Middle West Utilities Company, and R. S. McBeth, Tulsa, director public relations, Oklahoma Natural Gas Corporation. Mr. Vivian, who spoke on "Recent Developments in Public Relations," outlined practical methods of educating public service employees. Mr. McBeth, whose subject was, "Media—What and Why?" endorsed newspaper advertising as being the best and most productive for the utility. These talks were followed by discussions and a report of the work of the Public Relations Division by Keith Clevenger.



E. F. McKay *E. R. Ernsberger*

GAS DIVISION SESSIONS

The Gas Division met in the Gentlemen's writing room on the mezzanine floor of the hotel on both Tuesday and Wednesday afternoons, more than 100 being present at each meeting.

R. W. Hendee, Tulsa, gas superintendent of the Oklahoma Natural Gas Corporation, was chairman of this Division and, incidentally, was chosen to succeed himself for the coming term.

John S. Zink, Tulsa, industrial engineer of the Oklahoma Natural Gas Corporation, was first on the program, reading his paper on "Industrial Gas Problems of Oklahoma" which will be found in this issue of *Western Gas*.

After a discussion period, following Mr. Zink's excellent paper, Charles W. Robbins, Ponca City, general gas superintendent of the Oklahoma Northern Utilities Company, read a paper on "Recent Developments in Natural Gas Distribution," treating his subject under the three classifications, measurement, distribution and accounting. This paper presented a valuable review of a multitude of practices making for progress in these fields, and gave practical insight into what equipment manufacturers are contributing to better measurement. The speaker is an able exponent of medium pressure distribution, and had much to say on this topic in this convention paper. His article in the March issue of *Western Gas*, on "Medium Pressure Distribution for Low Consumer Saturation," was read with much interest, and portions of his convention paper will be offered in a later issue.

The third paper of the session was one prepared by A. E. Higgins, New York, field representative, American Gas Association, on "The Blue Star Home Plan." Mr. Higgins was unable to be in Tulsa for the convention. His paper stressed the necessity of the gas man working with the prospective builder of homes, the architect, the builder and contractor, plumber, etc., that adequate gas piping might be installed at the time of the erection of the home.

Following the reading of this paper a list of questions was submitted by the chairman which provoked much discussion. The questions were:

"Do you think it necessary to protect service lines from corrosion?"

"What factors do you consider in determining whether to use an orifice or displacement meter for commercial and industrial consumers?"

"What practical methods are in use for the removal of dirt, sand, fluid, etc., from distribution system lines?"

GAS DIVISION OFFICIALS

On Wednesday afternoon at the Gas Division meeting the first item of business was the election of officers for the day. R. W. Hendee was re-elected chairman. Charles W. Robbins was elected to the Board of Directors for the Division to succeed Logan W. Cary, Oklahoma City, Oklahoma Gas & Electric Company, whose term expired. The other directors of the Division are H. L. Montgomery, the Empire Companies, Bartlesville, and R. C. Sharp of the Oklahoma Natural Gas Corporation, Tusa.

Other items of business were announcements regarding the Southwest Gas Meter Short Course which is to be held April 24, 25 and 26, at the University of Oklahoma, at Norman, and of the Gas Conservation School which has formerly been held at Bartlesville. Discussion was entertained as to whether this school should be continued. It was voted in the affirmative with the amended motion that a committee be appointed to investigate the feasibility of its being merged with the Meter School. No action will be taken on this, however, until after the next session of the Meter School. The date for the Conservation School will be announced later.

The first paper read was one on "Gas Refrigeration," by Logan W. Cary, Oklahoma City, Oklahoma Gas & Electric Company. Mr. Cary related in interesting form his own experience with gas refrigeration and advocated that the gas industry get behind the refrigerator with its influence and either handle it or aid the one who does handle it. "It offers a small revenue per individual user," he said, "but affords a splendid point of contact with the housewife."

At this point of the meeting Alexander Forward, managing director of the American Gas Association, was introduced by Mr. Sharp of the Oklahoma Natural Gas Corporation. Mr. Forward in his short address to the group expressed his appreciation for the manner in which the natural gas men have entered into the work of the American Gas Association since the amalgamation of a year ago.

The second paper of the afternoon session was delivered by E. L. Rawlins, associate gas engineer of the United States Bureau of

Mines at Bartlesville. Extracts from his paper on "The Cooperative Work Between the Gas Association and the Bureau of Mines" will appear in an early issue.

A paper on the "A. G. A. Accounting Section" by E. H. Poe of Tulsa, Southwestern division manager, Central States Power & Light Corporation, followed that of Mr. Rawlins. In this paper and in the discussion that followed, due emphasis was given to the need for close integration between the accounting department and the other departments of a company.

Following this the meeting was thrown open for the discussion of the following problems:

"What method should be used in removing water from a producing gas well, keeping gas wasted to a minimum?"

"What practical methods are in use for removal of dirt, sand, etc., from transmission pipe lines?"

"What methods are commonly used in removing master gates that cannot be opened from high pressure wells?"

"What type of line heaters are giving satisfactory results as to efficiency and safety?"

There was a round of specific discussion on these questions until adjournment.

On Wednesday night was held the chief social function of the convention, the annual banquet and entertainment, the chief speaker being the Honorable Charles A. Eaton, of North Plainfield, New Jersey.

Alexander Forward, in his address at the Thursday morning general meeting, complimented Tulsa and Oklahoma for their part in the rapid and solid development of the Southwest and spoke of the state's future as an industrial and financial center of the country. He again spoke of the consolidation of the Natural Gas Association with the American Gas Association, offering his opinion that "this consolidatoin has brought to our ranks not only strength in numbers of gas company and individual members, but has brought to it an accession of leadership."

A round of luncheons, meetings, automobile rides and social good times was arranged for the women of the convention, and each evening a dance was held in the Mayo ballroom.

Of special interest to the gas men were the 17 exhibit booths on the fifteenth floor of the hotel. Among these were booths installed by the Servel Corporation, the Smith Separator Company and the A. B. Stove Company.

The convention proper disbanded Thursday afternoon.

GAS APPLIANCE SOCIETY SETS APRIL 29—MAY 5 FOR DRIVE

A special announcement from the Gas Applicance Society of California, which has headquarters at 180 New Montgomery street, San Francisco, states that the annual Spring Campaign will this year be held the week of April 29 to May 5. The name selected for the Appliance drive this year is "1928 Gas Range and Water Heater Exhibit."

Management of the campaign is in charge of a central committee headed by F. U. Naylor, executive secretary and campaign director, and manager of gas sales for the Pacific Gas and Electric Company. This year's campaign will feature an automatic heat regulator worth $18, which dealers may give away free during the week on any gas range regularly priced at $118 or more. Another sales inducement is seen in the committee's recommendations that automatic water heaters be sold for $5 down with an attractive replacement allowance made for tank water heaters, water coils, etc. The campaign committee has under preparation a special newspaper clip sheet similar to those used in previous campaigns, which will contain appropriate gas appliance publicity, with several suggested advertisement lay-outs. A stiff cardboard campaign poster will be used by dealer members throughout Northern California, in window trims and store displays. A free mat service is available on material contained in the newspaper supplement, and members of the society are arranging with manufacturers whom they represent for special publicity and appliance literature

Spring exhibit week is the first of three special campaigns planned by the Gas Appliance Society for the present year.

"Western Gas" to Issue Natural Gas Edition

THE past year has been one of astonishing activity wherever natural gas is developed and transmitted, and this development centers national attention upon the May 7-10 meetings of the Natural Gas Department, American Gas Association, at Dallas.

Western Gas in its special Natural Gas Edition, to be published May 1, will condense the important progress of the past year into a number of news features, and in addition will offer contributed articles touching important phases of natural gas and natural gasoline industries.

Since this special issue is dedicated to the success of the Dallas sessions, it will contain complete and late details on convention arrangements and program.

Copies of *Western Gas'* Natural Gas Edition will be distributed from our Booth No. 304, located just back of convention registration headquarters in the Manufacturers Building, Texas Fair Grounds, in which building the convention exhibits will be housed.

Watch for this special issue, at Booth No. 304, where staff members will be glad to greet you.

GAS USE GAINS IN NEW WESTMINSTER AFTER CITY SALE

About eleven months ago the British Columbia Electric Railway Company took over the New Westminster municipal gas plant and added that territory to area it then supplied with gas. Since that time considerable expansion has been made as witnessed by the fact that during the past nine months 238 new customers have been secured, and the average monthly consumption has increased 350,000 cubic feet. One of the signs of the development of gas business in New Westminster is the opening up of a gas appliance showroom in its New Westminster building by the B. C. Electric Railway Company. Gas ranges, fires, furnaces, refrigerators, hotplates, and other lines are all now carried in this showroom.

STOVE MANUFACTURER PASSES

Lazard Kahn, president of the Estate Stove Works of Hamilton, Ohio, died at his home on March 8th. Mr. Kahn and his brother, Felix Kahn, who died in 1924, founded the first plant of the stove works in Hanging Rock, Ohio, which later was moved to Hamilton, its present location. Mr. Kahn was 77 years old and is survived by his widow, one daughter and four sons.

Mid-West Gas Men *in* 23rd Annual Convention

H. R. STERRETT, chairman of the program committee for the Mid-West Gas Association's annual convention, which is scheduled for Lincoln, Neb., April 18, 19 and 20, with headquarters at the Cornhusker Hotel, has completed tentative arrangements for the program of this 23rd annual gathering of the Mid-West body.

On the morning of Wednesday, April 18th, officers and past presidents will meet with the Association council and a meeting of the nominating committee will also take place.

The program of convention sessions begins Wednesday afternoon with an address of welcome from the Mayor of Lincoln, to which C. N. Chubb, president of the Iowa-Nebraska Light and Power Company, Lincoln, Neb., will respond. R. L. Klar of Des Moines, Iowa will report on the gas meter short course conducted at Ames; F. L. Hanlon, Mason City, Iowa, on legsilative matters; Joe Carmichael, Des Moines, Iowa, on the State Committee on Public Utility information. A. L. McKinstry, Cedar Rapids, Iowa, will speak on "Modernizing Home Economics Equipment in Educational Institutions." C. A. Nash, Davenport, Iowa, president of the Mid-West Gas Association, will deliver the president's address at this session.

During the Thursday morning program there will be reports on the Technical Section and Industrial Section of the organization, by E. L. Fischer, Davenport, Iowa, and C. F. A. Schuldt, St. Paul, Minn., respectively. John M. Drabelle, Cedar Rapids, Iowa, will deliver a paper on "The Construction and Operation of the Boone-Ames Gas Transmission Line," and another paper on "Higher Pressures and Their Effect on the Distribution and Utilization of Gas" will be read by E. L. Fischer, Davenport, Iowa.

On Thursday afternoon will come the address of Oscar H. Fogg, president of the American Gas Association, and reports on the Advertising Section and Commercial Section will be offered by H. Parker Weeks, Davenport, Iowa, and Stanley Taber, Lincoln, Nebraska, respectively. There also will be a paper by E. L. Hinchcliffe, Chicago, Ill., on the subject "Needed—Better Merchants in the Gas Industry," and a symposium on "Load Building."

R. B. Searing, Sioux City, Iowa, and R. J. Canniff, Chicago, Ill., will report respectively for the Accounting and Manufacturers Sections at the Friday morning meeting. Thorn Browne, Lincoln, Neb., will speak to the topic "The Utilities Service and Obligation to Its Public," at the same session, and C. J. Hellmers of Lincoln, Neb., will present a paper on "Training Employees to Properly Represent Their Company."

WANTS HENNESSEY FRANCHISE

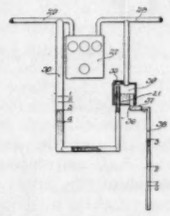
The Mid-West Gas Company is seeking a gas franchise at Hennessey, Okla., the matter now being in the hands of the town board's gas franchise committee.

NEW OFFICES ARE OPENED BY OKLAHOMA NATURAL

The Oklahoma Natural Gas Corporation of Tulsa, recent purchaser of the gas interests of the Oklahoma Gas & Electric Company, has established an office at El Reno, Oklahoma. J. W. Lockridge, formerly of the Sapulpa, Okla., office is in charge. E. R. Bradbury of the Haskell office has been chosen manager for the new office at Enid, Okla.

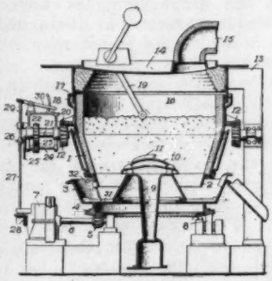
THIS MONTH'S PATENTS PERTAINING TO THE INDUSTRY

1,657,324. DEMAND METER FOR GAS. Jacob M. Spitzglass, Chicago, Ill., assignor to Republic Flow Meters Company, Chicago, Ill., a Corporation of Illinois. Filed Oct. 27, 1924 Serial No 745,958. 4 Claims. (Cl. 73—167.)



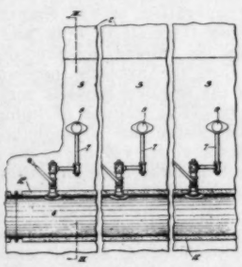
1. The combination with a conduit for fluid, of a vessel so shaped as to contain balanced liquid columns and so connected with the conduit that said columns respectively are subjected to different pressures produced by flow of fluid in said conduit, and an overflow tube pivotally connected with one of said columns so as to be capable of being swung about a horizontal axis to permit return of liquid therefrom to said vessel while said tube remains connected with said vessel.

1,659,493. GAS PRODUCER. Charles W. Lummis, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a Corporation of Massachusetts. Filed Apr. 19, 1919. Serial No. 291,266. 2 Claims. (Cl. 48—85.1.)



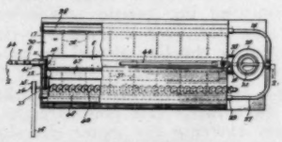
1. In a gas producer, a rotatable producer body, a rotatable ash pan in water sealing relation to the bottom of said body, said producer body and pan being relatively rotatable, and the pan having a central portion through which a blast is adapted to be delivered, the pan and body being supported substantially coaxially but wholly independently of each other.

1,658,796. BY-PRODUCT COKE OVEN AND METHOD OF OPERATING SAME. Joseph Van Kirk Borland, Clairton, Pa. Filed Sept. 13, 1923. Serial No. 662,497 3 Claims. (Cl. 202—8.)



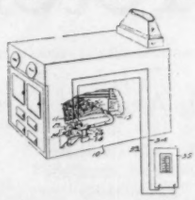
1. In the operation of a battery of by-product coke ovens, having a fuel gas main for supplying fuel gas to each of the ovens of said battery, the method of providing uniform distribution of the fuel gas from said main to each oven of said battery of ovens, which includes as a step, maintaining the gases at substantially a uniform temperature throughout the entire length of the fuel main.

1,658,676. APPARATUS FOR THE PRODUCTION OF CARBON BLACK. William Farrell Fulton, Shreveport, La., assignor to Palmer Corporation, a Corporation of Delaware. Filed May 31, 1927. Serial No. 195,420. 4 Claims. (Cl. 134—60.)



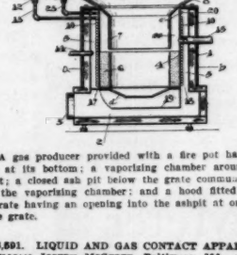
1. An apparatus for the production of carbon black comprising a rotary collector cylinder having communication with a source of gas supply and for heating the gas, manifolds for receiving the heated gas from said collector cylinder, arches having passages for receiving the gas from the manifolds, a substantially horizontal combustion tube between said arches and forming therewith curved thin combustion spaces opened and communicating at the upper portions for directing the decomposed gases at substantially right angles against the rotary collector cylinder.

1,658,291. COMBUSTION-GAS-SAMPLING APPARATUS. Frederick D. Potter, Linden, N. J., assignor to Combustion Control Company, Inc., New York, N. Y., a Corporation of New York. Filed July 11, 1923 Serial No. 650,804. 7 Claims (Cl. 73—51.)



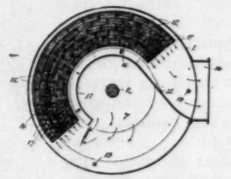
1. The combination with a combustion apparatus comprising a combustion chamber, of a conduit communicating with said combustion apparatus at both ends, the inlet thereof being from the combustion chamber, power means for creating a circulation of combustion gases through said conduit, means for taking the temperature of the combustion gases between the combustion chamber and the circulating means, a CO_2 machine, an intake pipe therefor extending into said conduit and having its inlet directed against the gas stream, and an outlet pipe therefor extending into said conduit and having its outlet directed with the flow of the gas stream in said conduit.

1,658,789. GAS PRODUCER. John Mawson, Vine Place, Sunderland, England, assignor, by mesne assignments, to Chas. T. Knipp, Chicago, Ill. Filed Oct. 7, 1920. Serial No. 415,249. Renewed June 27 1927. 13 Claims. (Cl. 48—64.)



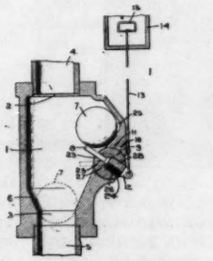
2. A gas producer provided with a fire pot having a grate at its bottom; a vaporizing chamber around the firepot; a closed ash pit below the grate communicating with the vaporizing chamber; and a hood fitted under the grate having an opening into the ashpit at one side of the grate.

1,650,591. LIQUID AND GAS CONTACT APPARATUS. William Joseph McGurty, Baltimore, Md., assignor to The Bartlett Hayward Company, Baltimore, Md., a Corporation of Maryland. Filed June 19, 1925. Serial No. 38,306. 1 Claim. (Cl. 183—24.)



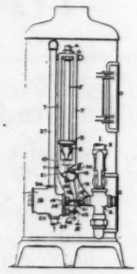
In an apparatus of the character specified, the combination of a casing; a laterally curved chamber located at the upper portion thereof and in communication at one end with the interior of the casing through a passage extending centrally of the casing, the chamber at its opposite end being connected to a discharge port; a series of vertically disposed plates arranged in spaced relation within the chamber; and a series of vertically disposed spaced wires located between the plates.

1,658,099. AUTOMATIC GAS SHUT-OFF VALVE. Norbert V. Reardon, Arlington, Mass. Filed July 24, 1926. Serial No. 124,561. Renewed June 24, 1927. 2 Claims. (Cl. 137—162.)



2. In an automatic gas shut-off valve, the combination with a casing having an inlet and an outlet, the latter having a tapered valve seat, of a ball valve adapted to close said seat, a plug mounted for turning movement in the wall of the casing, a fusible ball-supporting member carried by the plug and normally supporting the ball in inoperative position above the valve seat, and manual means for turning the plug into a position where the ball will roll off from said support.

1,638,624. WATER HEATER. John Ellis, West View, Pa. Filed Mar. 11, 1926. Serial No. 93,837 3 Claims. (Cl. 236—23.)



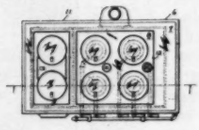
1. In a water heater, the combination of a water motor comprising a water cylinder having a movable piston slidably fitted therein, a primary water inlet valve carried by the piston, a gas valve operated by said motor piston, a thermostat, and a main water inlet valve independent of the piston, the primary water valve adapted to admit a small quantity of water to the heater when the gas valve is operated by the motor piston and the main water valve adapted to open to increase the quantity of water to the heater by movement of the thermostat and actuated lever.

1,649,660. WATER-HEATING ATTACHMENT FOR HOT-AIR FURNACES. Chas J. Bristol, Des Moines, Iowa, assignor to Globe Machinery & Supply Company, Des Moines, Iowa, a Corporation of Iowa. Filed Dec. 21, 1926. Serial No. 156,121. 1 Claim. (Cl. 257—248.)

A water heating element for use in connection with hot air furnaces of the class having two openings for a water-heater arranged in the wall of the furnace in substantially vertical alignment with each other and relatively close together, said water heating element being formed of a single piece of pipe having substantially straight parallel end portions in substantially vertical alignment with each other and designed to project through and beyond said openings in a furnace wall, to connect with water circulating pipes on the exterior of the furnace, said heater being capable of movement inwardly and outwardly through said openings for adjustment of the heater relative to the interior of the furnace or to the water circulating pipes on the exterior of the furnace, the central portion of the pipe being formed into a single approximately circular loop the diameter of which is considerably greater than the distance between the ends of the pipe, and the entire body of the heater element between the end portions thereof being contained within the space between two parallel horizontal planes, one at the top of the upper end of the pipe and, the other at the bottom of the lower end of the pipe.

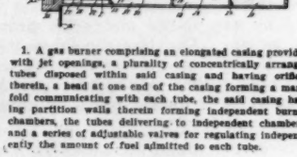
1,647,602. COOKING TOP FOR STOVES. George Hammer, Oakland, Calif., assignor to Hammer-Bray Company, Oakland, Calif., a Corporation of California. Filed Dec. 29, 1923. Serial No. 683,364. 2 Claims. (Cl. 126—211.)

1. In a stove of the character described, a fire box for solid fuel, a top-gas burner chamber separated from the box by a common side wall, a one-piece cooking top arranged over said box and chamber and having integral portions thereof overlying the top edges of the front and side walls of said box and chamber including said common side wall and defining openings smaller in area than the associated box and, chamber, top-sections provided



with lid receiving perforations and removably fitted in said openings, and lids fitting in said perforations of said top sections.

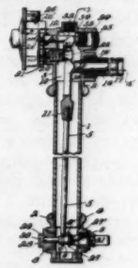
1,642,153. GAS BURNER. William Wallace Kemp, Baltimore, Md., assignor to The C. M. Kemp Manufacturing Company, Baltimore, Md., a Corporation of Maryland. Filed Mar. 13, 1925. Serial No. 15,315. 13 Claims. (Cl. 158—105.)



1. A gas burner comprising an elongated casing provided with jet openings, a plurality of concentrically arranged tubes disposed within said casing and having orifices therein, a head at one end of the casing forming a manifold communicating with each tube, the said casing having partition walls therein forming independent burner chambers, the tubes delivering to independent chambers, and a series of adjustable valves for regulating independently the amount of fuel admitted to each tube.

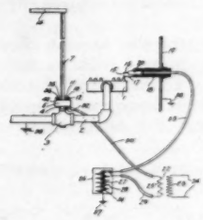
1,640,245. THERMOSTATIC OVEN-HEAT REGULATOR. Benjamin Edward Meacham, Lorain, Ohio, assignor to American Stove Company, St. Louis, Mo., a Corporation of New Jersey. Filed Nov 16, 1926. Serial No. 148,851. 7 Claims. (Cl. 236—15.)

1. A thermostatic oven heat regulator comprising a movable lever, a fuel valve operatively connected with one end of the lever, a thermostatic element engaging the said lever near its opposite end, a fulcrum located beyond the said thermostatic member, the end of said lever adapted to engage the said fulcrum, and means located between the fulcrum and the said thermostatic



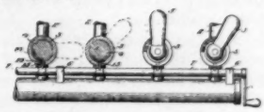
member, said means constantly pressing the lever against the thermostatic member and adapted to press the end of the lever against said fulcrum.

1,657,638. ELECTRICAL GAS-IGNITING DEVICE. Roy L. Paths, Los Angeles, Calif., assignor to Payne Furnace and Supply Company, Los Angeles, Calif., a Corporation of California. Filed Apr. 6, 1926. Serial No. 21,009. 4 Claims. (Cl. 175—115.)



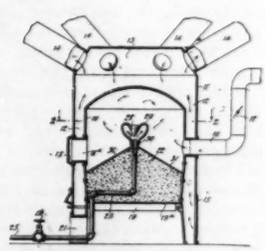
3. An electrical gas igniting device comprising, in combination with a gas burner provided with fuel supply means having a valve therein, an operating member secured to said valve and provided with a contact member secured thereto, manually operated means provided with a second contact member adapted to engage said first-named contact member upon movement of said manually operated means in one direction so as to establish contact between said contact members and also enable further movement of said manually operated means in the same direction to operate said valve toward open position, spring means normally tending to hold said contact members out of contact, means for producing an electric spark adjacent said burner, and an electrical circuit adapted to control said spark-producing means and including said contact members.

1,638,233. LOCK FOR GAS-STOVE VALVES AND OTHER VALVES. Calvin Smith, Somerville, N. J. Filed Jan. 28, 1926. Serial No. 84,369. 6 Claims. (Cl. 126—42.)



1. A lock for gas stove valves comprising a rotary shaft, means for operating said shaft, a plurality of valves, and a plurality of members mounted on said shaft for independent movement on said shaft for locking said valves.

1,650,498. GAS-HEATED FURNACE. Jean Delwiche, New York, N. Y. Filed Feb. 2, 1927 Serial No. 163,435. 1 Claim. (Cl. 126—116.)



A furnace including an inner shell defining a fire box and an outer shell cooperating with the inner shell to provide a heating space, a grate structure in the fire box, a mound of ashes heaped on the grate to prevent up-draft through the grate, a gas pipe including a delivery end projecting upwardly above the top of the ash mound, and overlapping segmental sheets of asbestos or the like covering the upper surface of the ash mound and leaving a central opening for the gas pipe

With *the* Metermen

Standard Pressure Base Favored *by* So. Cal. Assn.

EIGHTY-TWO members of the Southern California Meter Association met at the Los Angeles Gas and Electric Corporation cafeteria on Thursday, March 22, for the regular monthly session of that organization. Following the dinner, which began at 6:30, several items of business were disposed of, president T. K. M. Smith presiding. Seven new members were admitted, and reports were received from various committee chairmen.

Don Flesher, chairman of the entertainment committee, announced that cards will be sent out early in April giving details of the "blind bogey" golf tournament scheduled for April 22nd at the Rio Hondo Country Club. Those desiring to participate in this first association golf event are urged to return reservations promptly upon receiving the cards.

Mimeographed copies of the Association's constitution and by-laws were distributed to members at the March meeting.

The most important item of business transacted was the adoption of a resolution introduced by vice-president B. M. Laulhere, which read as follows: "Resolved, that the Southern California Meter Association go on record as favoring the adoption of a standard pressure base of 14.73 pounds per square inch for use in measurement of natural gas by orifice meter."

Following the adoption of this resolution T. T. Gill of the Union Oil Company of California explained the use of alignment charts in computing pressure extensions. Mr. Gill will amplify his remarks for publication in the May issue of *Western Gas,* accompanied by illustrations of several alignment charts.

Continuing the program of papers, H. Wedesweiler of the Los Angeles Gas and Electric Corporation discussed the "Computation of Orifice Meter Charts", and the concluding paper was a description of the Empire displacement meter by Sidney S. Small of the National Meter Company, who had a working demonstration of the Empire meter on display.

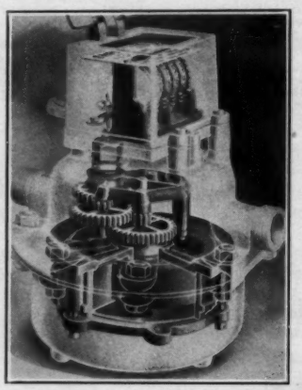
The Empire Displacement Meter

By SIDNEY S. *SMALL*
*National Meter Company**

TO DISCUSS the operation and maintenance of the oscillating piston Empire meter: this is a piston meter in which the motion of the piston operates a gear train or transmission, and this train in turn operates a registering device. The registering device is on the same principle as a speedometer. The gear trains are simple gear reductions.

Of all the principles which have been utilized for the measurement of liquids, the positive displacement structure we believe to to be the simplest, most accurate and most reliable. The value of the meter is determined upon its ability to measure liquids accurately over long periods of time. The meterman wants a reliable record and a certain degree of accuracy. It is my personal opinion that in at least ninety per cent of the cases where a positive displacement meter is indicated, the oscillating piston Empire will give satisfactory results. There is no universal meter for all services, nor will any meter give the best and cheapest results in every case. From its construction it can be seen that the measuring chamber should maintain an excellent degree of continued accuracy, where the meter is not overloaded, because the wearing surfaces are very large and the wear on the parts is comparatively small on account of the pressures upon the piston being balanced. In its motion around the case chamber the piston is guided by a pin which has a roller upon it; this roller guides the piston shaft which is fastened at the web.

This contact is a loose one so as to produce no strain whatsoever upon the motion of the piston in revolving around its case and is simply used as a joint forming contact with the case walls (the piston, being made of bronze, has a tendency to float in the liquid, and travels around its case wall with freedom, bearing upon the external ring and the lower head of the piston chamber.) It will therefore be seen that there is substantially no pressure upon these parts which will cause injurious wear or friction. The piston consequently travels with great accuracy and shows little wear after long use if placed under the proper working conditions. The less the lubricating value of the liquid the greater the wear. The measuring chamber is a device in which the ports are continually open to enlarging and contracting spaces; so that the liquid has a continuous and free flow at all times through the meter.



The case chamber, it can be seen, is of cylindrical form and has an abutment central with the case chamber, and the diaphragm of partition makes a division between the abutment and the case wall or cylinder. On each side of this partition are two ports—an inlet port and an outlet port. The piston is a split ring of cylindrical form having a slot which passes over the diaphragm. This piston has a motion around the case in which the center of the piston describes a circle around the center of the case chamber, but as the piston does not itself rotate, but slides back and forth upon this slot on the diaphragm, the meter is called an "oscillating meter" to distinguish it from meters in which the piston may rotate on its own axis.

There are four different spaces which are continually enlarging and contracting. We might call them the inner space and the outer space, and it will be seen that when the piston is at the point at which the inner space completely covers the inlet port the outer space is ready to discharge its greatest quantity. The holes which are drilled in the piston are to permit the liquid to completely fill the inner space. The holes which are drilled in the cylindrical wall of the piston are to provide an easy action at the ports, equalizing the pressures and relieving the piston from strains. The effective driving area of the liquid on the piston is equal to the entire cross-section of the piston. The fact that the lines of force which act upon the piston are always at right angles and tend only to drive it and not cause side-pressure, has been an important factor in the operation of the Empire meter. The piston is small in bulk and light in weight, and is moved by the slightest pressure; in fact, the pressure necessary to move it under the smallest flows is very difficult to measure. The volume of liquid displaced by the piston in a single revolution is equal to the entire volume of the measuring chamber, so that a small piston displaces a large amount of liquid. The areas of the inlet and outlet passages into the measuring chamber are large as compared to the size of pipe leading to the meter, so the friction losses in the meter chamber are quite small; in fact, the greatest proportion of the friction loss through the meter is due to restriction in its case. This is placed so as not to overload the meter.

MAINTENANCE AND INSTALLATION

In installing a positive displacement meter the meter should be so placed that it will be full of liquid at all times. Should there be gas in the lines this should be trapped out by permitting the gas to escape or by by-passing the gas past the meter. If the liquid is gasoline the line should be covered from the rays of the sun—to keep it from vaporizing. The sediment trap should be installed so as to keep dirt and foreign substances from entering the meter chamber.

When the Empire meter stops, the first place to look for trouble will be in the register and change gears. Sometimes the change gears will become worn or out of mesh, in which case the meter will still run but will not register. This is a simple condition for a mechanic to remedy. After long

*Presented before the Southern California Meter Association, March 22, 1928.

usage the gear train may become so worn that the pinions will need to be replaced. In this case the meter chamber will continue to operate but it will not register. In case the meter is completely stopped the trouble will undoubtedly lie in the measuring chamber and will be due to a foreign substance which has blocked the piston from its normal travel. Wear will cause the meter chamber to operate very easily—as you then get a looser bearing. Driving the meter hard will cause the division plate or bridge to become worn. If, and when the meter chamber is badly worn it would be best to send this chamber, or the meter, to competent mechanics to bring it back to its original state of efficiency. Some companies have sufficient facilities and trained men who can do this for them. Should it be found that the meter is off 4 per cent in accuracy on the flow at which it regularly works and that it will measure accurately on the smallest flow, it is only necessary to install a different gear ratio in the change gears, and for each size of meter we have a range of gears that will permit us to change its registration from ¼ per cent to 6 per cent. Our smallest meter, the ⅜-inch meter, has measured oil accurately from 1/6 gallon per minute to 6 gallons per minute. Our 6-inch Empire meter has measured oil accurately from 50 gallons per minute to 500 gallons per minute. Each size of meter will have a different range of accuracy when using different liquids.

A difference in viscosity will make a difference in registration, as will also a difference in temperature. No tables or data showing the effect of a change in viscosity affecting the registration of the Empire meter are available. The effect of change in temperature will affect the registration in the ratio of 1 per cent difference for each 25 degrees Fahrenheit. This meter does not automatically compensate for changes in temperature; it is necessary to compute them.

The material from which our meters are made is a composition bronze. We have also used Monel metal in the measuring chambers for certain corrosive liquids and our company has experimented with several different materials in order to provide a meter that will give satisfactory results under such conditions. These experimentations are still in progress, and I believe we are now on the right track. The Empire meter is not recommended for measurement of ammonia and sulphuric acid.

We supply information sheets to the trade in which we ask for complete data as regards temperatures, pressures, kind and quantity of liquid to be measured. This is to guide us in making the proper installation in the first case.

Calibration tests should be run frequently on the Empire meter, particularly when it is changed from one kind of service to another.

At a meeting of the directors of the Bartlett Hayward Company, held on February 28, Howard Bruce resigned as president of the company and was elected chairman of the board. Howell Fisher, who has heretofore been first vice-president and general manager, was elected president. Albert C. Bruce was elected a vice-president. The other officers of the company were re-elected.

Mr. Bruce has been president of the Bartlett Hayward Company for 18 years. Mr. Fisher has been vice-president for 12 years.

The Missouri Natural Gas Company has placed a deposit of $5,000 with the city of Poplar Bluff, Mo., as a guarantee that it would supply natural gas to the city within two years time. A gas franchise was recently granted by the city council subject to popular approval at the polls.

Computing Orifice Meter Charts

By H. WEDESWEILER
*Los Angeles Gas and Electric Corporation**

THERE is a lot of room for discussion on the question of orifice meter reading and computation. We may have ideas on how close it is necessary to read a chart, on the saving in time possible, when readings are averaged over comparatively long periods of time, on the difficulties involved when meters are cut into service or when the flow fluctuates widely. Then we might consider the advantages and disadvantages of direct reading of charts and finally touch on the matter of extension tables, and short cuts in computations.

From actual trial we come to the conclusion that readings estimated to the closest one-hundredth of the chart range are good. However, if the readings fall below a certain minimum, say 5 per cent of the chart range, poor results will be obtained. On a 50-inch chart, 5 per cent of the range is 2½ inches. In other words, an orifice meter has not only a maximum capacity, but a minimum as well. The minimum flow is approximately one-fifth of the maximum. If a greater range is to be coped with, an auxiliary differential gauge giving more accurate readings at a low differential should be introduced. Thus hooking up a 10-inch gauge with a 50-inch, increases the range 10 per cent, because we can read the 10-inch chart more accurately at a lower differential.

The time element in chart reading deserves a little careful consideration. Where a large number of charts are to be read, it is a tempting saving in time to average the charts each hour, instead of each quarter hour, regardless of how the flow of gas varies. The more numerous the readings, the more accurate the result obtained with varying flows. Where the flow changes very gradually there is, of course, no object in numerous readings.

If the load increases 25 per cent every 15 minutes for an hour, the discrepancy between the two methods of averaging is nearly 3 per cent.

Increase in Flow Each 15 Minutes for an Hour.	Discrepancy Between the Two Methods
12.5%	0.4%
25%	2.8%
50%	9.6%
100%	23.9%

Readings should be taken over smaller time intervals where the load increases and decreases sharply.

Our method of averaging areas falls down completely when the load drops to zero or where a meter is cut in or out of service. The results are too high, just as the hourly readings are far too high where the load changes sharply. Some pains should be taken to cut the meter in on the hour or quarter hour, for it is very troublesome to get an accurate reading. The logarithmic, or direct-reading chart obviates this difficulty, but there are other difficulties involved in its use that more than destroy this single advantage. Some of the disadvantages are the following: The ruling varies from point to point on the chart, making it more difficult to read. A different coefficient is required for each type of gauge, since exactly the same chart is put on all types of gauges. Each type of pressure spring requires a special setting.

*Presented before the Southern California Meter Association, March 22, 1928.

Finally, it is equally as difficult to compute as the ordinary form of chart.

We should consider the accuracy of computations in connection with the accuracy of the chart readings.

We obtain the following table by assuming a constant pressure reading on the following differential readings. Observe that 1 per cent of the chart range by no means indicates a unit quantity of gas for different points on the chart range.

	1% of chart range	
% of range of chart	% of maximum flow	% of prevailing flow
5 (minimum)	2.1	9.4
25	1.0	2.0
50	0.7	1.0
75	0.6	0.7

The surprising fact is that it is at all possible to obtain satisfactory results at the minimum reading (5 per cent), where a mistake of 1% of the chart causes a difference of over 9% in the amount of gas passed. Of course, the minimum reading should prevail only a small part of the day.

Considering, therefore, the fact that chart readings are only approximately accurate, it appears needless to exercise such meticulous care in computing pressure extensions—accurate to one part in 20,000, with five significant figures and three decimal places. Three significant figures will be more accurate than the chart readings, however carefully read.

My plea then is for a simplification in computing the chart readings, putting the pressure extensions more nearly on the same degree of accuracy as the meter readings. Anything better is misleading. Would you use your thumb for one measurement in an experiment and give it the same weight as a micrometer measurement?

Various short-cuts have been suggested to obviate the use of books of extension tables and adding machines, such as slide rules and graphs. To date I do not see how any of these short-cuts actually save time. However, there is room for standardization of factor books or extension tables. No two companies read charts alike or use the same factor books. It appears highly desirable that the various interested companies join in the compilation of a standard extension table.

There is nothing more disconcerting than the lack of a common standard in any industry, and the orifice meter, from meaning all things to all men, should be perfected to a point where we will all be using the same data, with confidence that they will be understood by all concerned.

KANSAS CITY, KAN., INDUSTRIAL FRANCHISE ACCEPTED

On March 12 the Industrial Gas Company of Kansas City, Kan., put up a $250,000 bond to guarantee fulfillment of the terms of an industrial gas franchise granted the company in that city last August and now formally accepted. Beginning of construction on a 490-mile 22- and 24-inch line from gas fields in the Texas Panhandle to Kansas City within 30 days is stipulated in the acceptance, according to news report. The line is said to call for expenditure of some $35,000,000 with completion scheduled for October 1.

New Engineers' Building, University of Oklahoma, at Norman

Southwestern Gas Meter Short Course *at* Norman April 24, 25 *and* 26

THE Southwestern Gas Meter Short Course, conducted annually under the auspices of the University of Oklahoma, the Oklahoma Utilities Association and the Oklahoma Corporation Commission, and recognized as an influence of first importance in solving the problems of gas measurement and regulation in the Southwest, will convene in Norman, Oklahoma, for a three-day session—April 24, 25 and 26.

Increasing favor on the part of the gas company measurement men has been accorded the past few years until now a large percentage of the companies in Oklahoma, Texas, Arkansas, Louisiana, Kansas and Missouri send representatives. Companies in Colorado are to be represented at the school this year, it is believed at this date.

Practically all arrangements have been completed for the school and the committees in charge feel that the attendance will be greater than ever, and the program correspondingly far-reaching in results accomplished. An approximate figure of 350 registered students has been given as a likely enrollment number. There were more than 275 enrolled in the school last year.

The general plan of the program is to be similar to that of last year, with the exception that the morning school will be divided into sections, one for fundamental work and one for advanced work. In this way the more advanced student can treat the problems that are his without in any way infringing upon the time of those who are making a study of the fundamental problems.

Class work will be conducted under the direction of the University engineering staff, gas company men and representatives from manufacturing companies. The classes will be held in the new Engineers' Building, which will also be the place of registration.

The afternoon work, which consists of demonstration of equipment and practice in repairing and rebuilding various types of meters, takes place in the machine shops of the University, also under the direction of the engineering staff. Establishment of this school has resulted in a great improvement in the manner of measuring gas and in the maintenance and testing of meters throughout the Southwest.

The social activity of the school is not lost sight of and the evenings are devoted to a banquet on the second night and to a smoker on another of the nights. Registration fee of three dollars includes the price of the banquet ticket.

A printed program is under preparation which will be sent out before the school convenes so that attention can be given to the choice of classes that will be attended. Registration lists of the various classes will be taken at the assembly hour and will be sent to the companies from which the students come, so that the officials may know in which classes their employees were registered. In former years a bulletin of the previous year's work has been published, but that plan will not be followed this year.

In addition to assisting with the instruction work, the manufacturers also have booths where their latest equipment is exhibited.

The members of the Short Course Committee are: E. A. Clark, Oklahoma Natural Gas Corporation, chairman; W. H. Carson, University of Oklahoma, Norman, director; J. H. Baxter, Southwest Gas Company, Houston; F. D. Frank, The Empires Company, Bartlesville; Eugene Metz, American Meter Company, Kansas City; B. P. Stockwell, Oklahoma Utilities Company, Bristow; E. F. McKay, Oklahoma Utilities Association, Oklahoma City; D. C. Williams, Ponca City Gas Distributing Company, Ponca City; V. N. Cone, Oklahoma Corporation Commission, Oklahoma City; F. W. Wright, Dallas Gas Company, Dallas; A. J. Kerr, Pittsburgh Equitable Meter Company, Tulsa; C. W. Robbins, Oklahoma Northern Utilities Company, Ponca City; D. A. Sillers, Lone Star Gas Company, Dallas; C. B. Day, Oklahoma Natural Gas Corporation, Oklahoma City.

The program committee is composed of C. W. Robbins, F. D. Frank, V. M. Cone; the registration committe of E. F. McKay and W. L. Crittenden; the banquet committee, W. H. Carson, C. B. Day, J. H. Baxter; the technical committee, A. J. Kerr, F. D. Frank, D. A. Sillers; the exhibits committee. C. B. Day; the publication committee, B. P. Stockwell.

Ground *and* Atmospheric Temperature Changes

(Continued from Page 27)

1 and 2 show that at a depth of 1 foot there was never a daily fluctuation greater than 3 or 4° F. and that there was a total variation during the entire period of the tests of 52° F.; graphs 3 and 4 show that at a depth of 2 feet the total temperature variation was 40° F.; graphs 5 and 6 show that a depth of 3 feet this variation was 34° F.; and graphs 7 and 8 show that at 4 feet this variation was 22° F.

The graphs in Figure 2 also show that the average temperature of the ground beneath the surface for the entire test approximated the 60° value used as a basis for defining the standard cubic foot of gas. The average daily temperature at each depth from May 12, 1926, to May 26, 1927, was calculated. The average temperature at a depth of 1 foot was 60° F.; at a depth of 2 feet, 62° F.; at a depth of 3 feet, 65° F.; and at a depth of 4 feet, 66° F.

As the depth is increased the minimum temperature to which a buried pipe line would be subjected is increased The graphs in Figure 2 show that the minimum temperature recorded for each depth was:

1 foot	36° F.
2 feet	39° F.
3 feet	48° F.
4 feet	54° F.

The results of these tests show the importance of ditching and burying pipe lines when possible. They also give some indication of the economical depths of cover required to offset undesirable temperature fluctuations. The economical depth is that at which the temperature fluctuations are reduced without excessive cost. A careful study of the cost of ditching and burying pipe lines should be made in each case to determine the economical depth of cover.

In general, pipe lines through which natural gas is flowing should be buried to offset the effect of temperature fluctuations. However, the results of these tests indicate that deeper ditching than is at present considered good practice for transmission lines is not warranted. The excessive costs of ditching and burying lines under such conditions probably would be greater than the advantages gained by reducing the temperature fluctuations at the greater depths. The rapid daily fluctuations are eliminated for all practical purposes within 1 foot of the ground surface, and the total annual variation is reduced by over half at a depth of 2 feet.

The temperature tests described in this report were conducted in one locality only, and the actual data, therefore, are strictly applicable only to the one set of conditions under which the temperatures were taken. However, the general effects of temperature variations obtained by a comparison between atmospheric and ground temperatures are probably the same in any part of the country, and the results in this particular case indicate what may be expected under other conditions. One condition which possibly would affect the results would be continued freezing of the ground throughout a season. No tests have been conducted under such conditions, and it is not known what depths would be required to eliminate the effects of continued low temperatures. It would be highly desirable in such cases, however, to have the pipe line buried below the frost line.

The study of the effects of temperature upon gas flowing in pipe lines will be continued by the Bureau with special emphasis

on measurement with orifice meters and measurement under vacuum in gasoline-plant operation.

ACKNOWLEDGEMENTS

This investigation was conducted under the direction of the Bureau of Mines with the cooperation of the State of Oklahoma.—Reports of Investigations, Bureau of Mines, Department of Commerce.

Distribution Conference Program

ACCORDING to A. G. A. officials, more than 300 will probably attend the Fifth Annual Spring Distribution Conference, to be held under the auspices of the Distribution Committee of the American Gas Association at the Hotel Stevens, Chicago, Illinois, on April 12 and 13.

M. I. Mix of the People's Gas, Light & Coke Company of Chicago is chairman of the committee in charge, and H. W. Hartman, assistant manager of the American Gas Association, is secretary.

A feature of the conference will be an open forum to be held in the afternoon of April 13. On Saturday morning, arrangements have been made for an inspection trip to the Gary plant of the National Tube Company.

The People's Gas, Light and Coke Company will provide entertainment for visiting ladies to the Distribution Conference. On Thursday afternoon, April 12, there will be a demonstration and inspection trip through the Home Service Department of the company. On Friday afternoon, April 13, there will be a luncheon and sightseeing trip of the city.

Following is the program of papers and reports arranged for the conference:

THURSDAY, APRIL 12, 1928

Morning—10:15

Introduction.

1. Report of Committee on Pipe Coatings, J. K. Crowell.
2. Report of Committee on Pipe Joints, O. S. Hagerman.
3. Paper: Joint Practice as Applied to Long Distance High Pressure Transmission Lines, E. W. Kesinger.
4. Paper: Life of Pipe, R. G. Griswold.

Afternoon—2:00

5. Report of Committee on Meters, G. A. Lane.
6. Paper: Advantages of the Meter Bar, E. S. Umstead.
7. Report of Committee on Cast Iron Pipe Standards, Walton Forstall.
8. Report of Committee on Pipe Materials, V. C. Hoddick.

FRIDAY, APRIL 13, 1928

Morning—10:00

1. Report of Committee on High Pressure Transmission of Gas, F. A. Lydecker.
2. Paper: Automatic Pressure Boosters for District Regulators and Pressure Regulation for High Pressure Holders, E. H. Enander.
3. Report of Committee on Distribution Portable Equipment, J. H. Braine.

FINISH 50,000-GALLON PLANT IN 35-DAY PERIOD

With the first unit of its gasoline absorption plant, located on the California Petroleum Company's Bauman lease, at Signal Hill, in operation 35 days after construction began, the California Gasoline Company feels that something of a record has been made. J. B. Gill Corporation had the contract for construction, with W. J. Galvin supervising for the California Gasoline Company. The new plant has a present daily capacity of 50,000 gallons.

William Baurhyte

A. B. Day

H. L. Masser

L. A. G. *and* E. Corporation Has Executive Changes

WILLIAM BAURHYTE, president of the Los Angeles Gas and Electric Corporation, tendered his resignation, effective March 31st, at the March 28 meeting of the company's Board of Directors. Executives and department heads of the company learned of Mr. Baurhyte's intention to resign at an informal dinner meeting held in the corporation's cafe on March 21.

Mr. Baurhyte, who will remain a member of the L.A.G. and E. directorate, was re-elected to his fourth year as president on March 7, having assumed the presidency in February 1924. Prior to that time he was vic-president and general manager.

His service with the corporation dates from September 1, 1903, when he assumed the second vice-presidency, having been called from the ranks of the Pacific Gas Improvement Company for that purpose. Mr. Baurhyte entered business life as a law-clerk in San Francisco, 54 years ago, and has been in the public utility business for 45 years During his extensive service he has established a wide acquaintance in utility circles all over the country, and he served as president of the Pacific Coast Gas Association for the 1912 term.

Addison B. Day, executive vice-president and general manager of the corporation, succeeds Mr. Baurhyte and will retain the duties of general manager in connection with the presidency.

Mr. Day's entire business career has been spent in the service of the utility which he will head as chief executive. He entered the employ of the Los Angeles Lighting Company, predecessor of Los Angeles Gas and Electric Corporation, in charge of the gas stove department, February 1st, 1895. He has risen successively to the positions of bookkeeper, chief clerk in the gas department, chief clerk in the electrical department, manager of the appliance department, auditor, assistant secretary, manager of operation, general superintendent, vice-president, and executive vice-president and general manager. He was chosen to this latter position in February, 1924.

Mr. Day is recognized as one of the leading executives in the public field on the Pacific Coast, and his succession to the position of president was a foregone conclusion when Mr. Baurhyte decided to retire.

Another official change in L. A. G. and E. personnel is the elevation of H. L. Masser, formerly gas engineer, to the post of vice-president and executive engineer, in which capacity he will have charge of all production, distribution and construction operations, both gas and electric. Mr. Masser was graduated from the University of California in chemical engineering, in 1914. He served with the engineering department of the Southern California Gas Company and Midway Gas Company, and after the World War was with the California Railroad Commission. His service with the Commission was from 1919 to 1924, the last two years as gas engineer. In 1924 he went with Los Angeles Gas and Electric Corporation as gas engineer. He is a director of the corporation.

NORTH VANCOUVER EXTENSIONS AWAIT FORMAL AGREEMENT

The agreement between the British Columbia Electric Railway Company's gas department and the councils of the City of North Vancouver, and of the North Vancouver Municipal District now only requires formal signature to be completed. Under this agreement the company will spend $50,000 or more in North Vancouver between now and the end of the year, and will lay approximately 10 miles of gas main during that period. It is proposed to bring the gas supply from the existing Grandview holders of the company to the shores of Burrard Inlet. The mains will then be carried across the river by the bridge until the draw portion in the center is reached. The mains will then be lowered below the waters and lay across the bed of the inlet until the far end of the draw portion of the bridge is reached, at which point they will again be carried by the bridge to the North Vancouver side of the inlet. Permission to carry the gas mains across the Burrard Inlet by this route has been applied for, but no official announcement has been made by either the gas company or the bridge commissioners.

DISTRICT MANAGERS CHANGE

Due to the resignation of W. P. Thompson, Tipton manager for the Southwestern Light and Power Company of Oklahoma City, several personnel changes have been made by the company. Roy Holt, manager of the Temple district was transferred to Tipton, succeeding Mr. Thompson. B. H. Spratt, who was formerly at Grandfield, was made manager of the Temple district succeeding Mr. Holt. G. E. Hutto, formerly at Hollis, was appointed manager at Thomas, where a franchise was granted the company last month.

The daily average production of natural-gas gasoline suffered another decline in January, 1928, when the total output was 143,900,000 gallons, or a daily average of 4,640,000 gallons. The major portion of this decrease in production occurred in the Seminole district of Oklahoma. Stocks of natural-gas gasoline at the plants on January 31, 1928, amounted to 31,077,000 gallons, which represents a slight increase over the previous month. Blending at the plants declined but the use of natural-gas gasoline by refineries continued heavy, particularly in California.

Inspecting Furnace Installations

By A. B. Wicks

Heating and Ventilating Engineer
Department of Building and Safety
City of Los Angeles

LOS ANGELES, Calif., has an ordinance adopted August 1, 1927, covering the installation of warm air furnaces. Enforcement of the ordinance falls upon the city's Department of Building and Safety. While the system of installation inspection described in this article has been applied in Los Angeles only recently, those in charge of its operation feel confident of its satisfactory functioning. Mr. Wicks, who describes the system in these columns, will be glad to extend cooperation to any city inspector where warm air furnace legislation is contemplated, by furnishing copies of Los Angeles ordinances and of forms employed by inspectors in that city. Inquiries should be addressed to the author, City Hall, Los Angeles, or may be sent care of Western Gas.

A. B. Wicks

THE ordinance governing the installation of warm air furnaces in Los Angeles became effective August 1, 1927, after much deliberation on the part of furnace contractors and the Department of Building and Safety. The number of questions regarding various sections of the act and their true intent have been at a minimum as compared with the various acts regulating other branches of the building industry.

However, as is the case with every new ordinance, the problem of effective and economical inspection became the main problem of the Department of Building and Safety. As the budget of the Department did not provide for regular furnace inspectors, men were drafted from the Inspection Department of the Building Division and assigned to furnace installation work only and the usual inspection methods of the Building Division followed out. The Building Inspectors are assigned a district which they cover at regular intervals, depending on the size of the district and the number of jobs therein and this procedure was adopted when furnace inspectors were first sent out.

FAULTS OF FORMER METHODS

The result of this method of inspection was that in the majority of cases the inspectors arrived on the job either before any work had been done or else after the job was roughed-in and lathed and frequently plastered. This meant that the inspection amounted to nothing more than a visit to the job, with no real good accomplished. Thereafter, the inspector called at the job every week or ten days until the furnaces were set and the job completed.

Frequently contractors made mistakes and the work was so far advanced by the time the inspector arrived that corrections were more expensive than the installation justified and much dissension arose from this cause. As a result there was a steady increase in the number of letters to the Board of Building and Safety requesting the setting aside of inspectors' orders. These orders, in most cases, pertained to the dimensions of furnace rooms, dimensions of doorways to furnace room and lateral heat pipes longer than 20 feet, installed without the booster fan, required by ordinance.

At the same time a study of the inspectors' reports revealed the fact that in many cases from three to six visits were made to the job between the time it was roughed-in and the furnace was set. In addition, the inspector was rarely there until several days after the furnace was actually set.

Very often the installation crew had moved away from the job and any order issued by the inspector meant that the contractor had to send men back to a job he considered complete, which resulted in considerable dissatisfaction.

During one 10-day period, 72 furnace permits were issued by this Department. Six weeks later records showed that there had been 206 visits made on these jobs—nearly three to the job—and only 13 of the jobs reported complete.

In an effort to correct this condition of affairs, it was decided to revise the system of inspection and see if the waste of inspectors' time and mileage could not be reduced.

As a necessary preliminary to inaugurating a call system of inspection, letters were sent to all furnace installation contractors stating that on and after March 19, 1928, contractors would be required to call or write this office for roughing-in inspection and again for final inspection when the installation was completed.

Red and white tags which have listed thereon the main items of a furnace installation to be examined were issued to all furnace inspectors.

The red and white tags are the same except that red tags have a notation that the items checked by the inspector are "not approved" and the white tags state that all items cehcked thereon "are approved." Items listed on the upper half of the tags pertain to those involved in roughing-in inspection while those on the lower half are for points to be covered during final inspection. Thus the tag left on the job shows at a glance

NOTICE MEtropolitan 5200

Department of Building and Safety
Heating and Ventilating Division
The following work installed at No._____

O _____

Authorized by permit_____was inspected_____

(See Other Side) Inspector_____

A fine of $500.00 is imposed by Ordinance No. 28700, N. S., for concealing or using any of the work installed before approved by the Department of Building and Safety.

NOTICE: Items checked are approved, See Notation ON OTHER SIDE

The following work in this building has been approved—

KIND OF WORK

O

Concealed pipe and fittings	Electrical control (wiring)	Vent	Vent connection (collars)	Leaders (collars)	Electrical work (finish)	Vent connection	Leaders	Gas Piping	Furnace room	Air supply	Furnace	Fan	Blower	Cold air return

Both sides of inspection tag used by Los Angeles City Department of Building and Safety are shown above. This tag (white cardboard) signifies that furnace installation has the Department's approval. Red cardboard tags, substituting "not approved" for "approved," on the lower form, are used where revisions in installation are necessary.

whether the inspection was for roughing-in or for final.

THE INSPECTION SYSTEM

The method of procedure and the system of inspection is very simple both in the office and in the field.

Calls or letters requesting inspection of furnace installation are entered on a book and the following day the inspectors are sent out on these jobs with a copy of the plans which were filed with this Department at the time the installation permit was issued.

If, after inspection, the job is satisfactory as far as it has progressed, the inspctors attach a signed white tag to the installation, which tag constitutes the inspector's written approval of the job up to that time. If the job fails to pass inspection the inspectors note on a red tag the items at fault and attach it to one of the faulty portions of the work.

In case there is a direct violation of the law, the inspector leaves on the job, in addition to the red tag, a written order requesting the necessary changes and a carbon copy of such order is turned into this office for future reference. These orders are only issued where there is a major violation of the ordinance and the red tag is a notation to the contractor of the items that must be corrected before the installation can be accepted.

Each morning the inspectors turn in a report showing the jobs on which red tags were issued the previous day and for what violation the red tag was issued in each case.

If, at the end of three days the contractor has failed to notify this Department that such violations have been corrected, the inspector handling that job makes another inspection to check up on the progress of the job. It is a distinct violation of the rules of the Department to lath or plaster a job before an approval of the roughing-in work has been given, in the form of a signed white tag on the job.

CHECK CALLS FOR INSPECTION

In addition, the daily list of inspection calls is checked against the installation permits issued to see that contractors are actually calling in for inspection as they have been requested to do.

All of the office work involved in this system can be handled by a clerk in less than one hour each day and provides a complete check up on the progress of all furnace installation jobs.

Although the new system of inspection has been in operation but a short time, the results have proved very satisfactory. Contractors are not subjected to delay in the progress of the work and at the same time inspection is complete in every way, thus rendering to the owner the service to which he is entitled.

When inspectors are sent out on a roughing-in inspection they are instructed to go over the entire building carefully and notify the contractor or owner regarding any portion of the installation or any work under way which will affect the acceptance of the job, even though the work has been merely indicated. One example of this is where the forms for the walls of the furnace room are under construction or where the doorway leading to a furnace room is being roughed-in too small, the inspector is told to caution the owner or contractor so that these items can be corrected without undue expense later on.

F. S. Wade

F. R. Bain

F. S. Wade New President *of* Southern Counties

AFTER having served as president of the Southern Counties Gas Company for the past 17 years, Ferdinand R. Bain resigned on March 21 at the regular monthly meeting of the board of directors held at company headquarters in Los Angeles. The board accepted Mr. Bain's resignation, which is effective immediately, and at the same meeting advanced Franklin S. Wade, vice-president and general manager of the corporation, to the new position of president and general manager. Mr. Bain becomes chairman of the company directorate.

F. S. Wade, who is widely known on the Pacific Coast as an executive and leader in the gas industry, began his career with the Los Angeles Gas and Electric Corporation upon graduation from the University of Southern California in 1905.

He joined the Southern Counties utility in 1912, soon after its formation, February 27, 1911. He was in charge of operations until 1925, when he was elected vice-president and manager of the company. Mr. Wade has been active in the introduction of natural gas in Southern California and in the coast-wide development of the gas industry, serving as president of the Pacific Coast Gas Association in 1922-23.

California Gasoline Body Adopts Standard Test

AT the regular monthly meeting of the California Natural Gasoline Association, held in Los Angeles, Calif., on March 14, 1928, a "Tentative Standard Pressure Charcoal Test for Natural Gas Gasoline Content" was adopted by a vote of the membership.

The standard as adopted is the outcome of the work which has been carried on by the gas testing committee of the association during the past several months, and represents a summing up of the best current practice in the determination of the gasoline content of natural gas by the manufacturers of natural gasoline in the state of California.

It is believed by all concerned that this standard test will be fair to both the producer and the manufacturer, and its use is recommended in connection with all royalty settlement tests.

If, as the result of the adoption and use of this standard test, any improvement can be made in the test method, such improvement will, after due trial, be incorporated in the standard procedure. It is hoped that this procedure will result in the evolution of the most practical test in the minimum space of time.

The standard as adopted will be published in the form of a bulletin by the Association in the near future, and will be distributed or sold to members or others who may be interested. When available for distribution copies may be obtained by communicating with the secretary of the Association, Paul D. Barton, 701 South Palm avenue, Alhambra, California.

MISSOURI GROUP'S PROGRAM HAS INTERESTING GAS FEATURES

THE Twenty-second Annual Convention of the Missouri Association of Public Utilities will be held at the Missouri Hotel, Jefferson City, Missouri, April 26th, 27th and 28th. Convention sessions will open at 9 A. M., April 26th. Among features of particular interest to gas men is a talk on "The Present Status of the Natural Gas Industry in the Mid-Continent Field", to be delivered by Fred Karr, director of public relations, The Gas Service Company, Kansas City, Mo. On the afternoon of the second day W. D. Thompson, industrial sales engineer, The Laclede Gas Light Company of St. Louis, Mo., will discuss "The Use of Gas for Industrial Loads for All Purposes", this feature to be illustrated with magic lantern slides. W. L. Berry, assistant sales manager of the Union Electric Light & Power Company, St. Louis, will deliver a paper on "Load Building—The Commercial Man's Obligation and Opportunity", at the session held on the morning of the 27th.

R. E Duffy, service engineer of the Missouri Public Service Commission, Jefferson City, Mo., will speak at the closing session on the topic "What Elements of Cost Should Properly be Given Consideration in Designing and Developing a Special Rate for House Heating with Gas." The executive meeting and election of officers will also take place at this final session of the convention.

Officers of the Missouri Association of Public Utilities are, Percy Redmund, chairman; Herman Spoehrer, treasurer, and J. B. Sheridan, secretary, 1017 Olive St., St. Louis.

1928 Calendar

American Gas Association, Fifth Annual Distribution Conference—Hotel Stevens, Chicago, Illinois, April 12 and 13.

Mid-West Gas Association—Lincoln, Nebraska, April 18, 19 and 20.

Arizona Utilities Association—Prescott, Arizona, April 26 and 27.

Missouri Association of Public Utilities—Jefferson City, Missouri, April 26, 27 and 28.

Southwest Public Service Association—Dallas, Texas, May 3-5.

Natural Gas Department, American Gas Association—Dallas, Texas, May 7, 8, 9, and 10.

Natural Gasoline Association of America—Tulsa, Oklahoma, May 22, 23, and 24.

Fifth Annual Metermen's Short Course—University of Oklahoma, Norman, Oklahoma, April 24, 25, and 26.

Pacific Coast Gas Association, Northern Regional Conference—Vancouver, B. C., June 6 and 7.

Pacific Coast Gas Association, 35th Annual Convention—Hotel Coronado, Coronado, California, September 17 to 20.

American Gas Association—Atlantic City, N. J., October 8, 9, 10, 11 and 12.

Industrial Gas Problems

(Continued from Page 16)

with a capacity of approximately 20,000,000 B.t.u. per hour, either oil or gas fuel.

Recently several engineering companies have been advertising tri-fuel burners for gas, oil and pulverized coal.

The movable, so-called air door on burners should rarely, if ever, be used to control the flow of air into the furnace. The purpose of this door is to keep the radiant heat off the boiler room floor and to cause the air to flow into the burner in a regular manner from all sides. The quantity of air should usually be controlled by the damper. When the air is controlled by the burner door the full draft of the stack is felt in the furnace and the air leakage is greatly increased.

Within certain limits if one boiler will carry the load it is better to use one than two. In our experience, from both operating and fuel economy points of view it is better to keep a building moderately warm at all times than to let the building become cold and attempt to heat up in an hour or two. When the fire is completely turned out the air doors on the burners and the dampers should be closed to prevent unnecessary rapid cooling off of the fire box and boiler.

FEW ACCDENTS

During the last several years we have had but few accidents with gas. In two of these, men were burned when they put a light in the boiler without first examining the gas supply valve to see if the valves were closed.

We have had some trouble due to modern construction of the almost air tight boiler rooms. We are continually calling to the attention of the owners and managers of the new buildings the necessity for an air supply to their boiler rooms that can not be closed. Considering that practically all fuel used in Tulsa is gas, this is not a bad record in that not one person has been severely injured in an industrial gas plant or boiler room, and that the total damage done could be covered by a few thousand dollars.

Combustion is merely the chemical union of an inflammable substance with oxygen. Combustion is rapid oxidation; the result and ultimate products are usually the same whether oxidation is rapid or slow. The opposite of oxidation is called reduction and consists of the removal of oxygen from various compounds. An oxidizing atmosphere is one that carries free oxygen, a reducing atmosphere is one that carries no free oxygen.

The combustible constituents of all fuels are corbon and hydrogen with the exception of a small percentage of impurities such as sulphur. Coal is principally carbon. Oil and gas are composed of carbon and hydrogen. The percentage of hydrogen increases with the decrease in specific gravity; in methane, CH_4, the chief member of the natural gas, we find approximately 25 per cent hydrogen and 75 per cent carbon. This hydrogen during combustion burns to water, the latent heat of which is usually lost. Approximately ten gallons of water are formed by the combustion of 1,000 cubic feet of gas.

Air, the principal supply of oxygen is composed by volume oxygen 20.91 per cent, nitrogen 79.09 per cent. The nitrogen, an inert gas, passes through the furnace diluting the active elements of the fuel and the oxygen, and reduces the efficiency of the heating equipment.

The kindling temperature of natural gas is higher than that of either coal or oil, being about 1240 degrees Fahrenheit. Due to this fact, when burning gas it is very essential that the burner and furnace should be selected with this in mind and so arranged that combustion is complete in the hot fire box.

Coal and oil are supposedly better fitted for certain purposes than gas. This idea came about by reason that both coal and oil have a higher theoretical flame temperature than gas. The approximate theoretical flame temperatures of the three fuels are:

Coal	3796 degrees Fahrenheit
Oil	3909 degrees Fahrenheit
Gas	3650 degrees Fahrenheit

While it is theoretically possible to obtain a higher flame temperature with both coal and oil this advantage is usually lost in that it is possible to burn gas with less excess air than with oil or coal.

I have observed gas-fired boilers operating at 300 per cent rating; a stack temperature less than the steam temperature leaving the superheater; a lower firebox temperature and lower stack than with oil or coal, the boiler being fired at the same rating. This was true even with clean boilers.

I have observed too that the almost flameless or clear gas fire when short of air will usually burn CO without smoke; and, that the yellow flame gas fire when short of air will usually produce a lot of smoke.

I have seen various types of burners tested under a shell type still. In each case the amount of gas used per hour was the same—15,000 cubic feet. The air for combustion was so controlled that in each test the CO_2 readings were always near 11 per cent. The clear or so-called flameless fire gave both a higher fire box temperature and a higher stack temperature than the bright yellow flame fire and consequently used more fuel per barrel of crude run to the still.

The lowest temperature gas flame that I ever saw measured was 1800 degrees Fahrenheit. The highest was in the above mentioned blast furnace in which the operator claims to have obtained near 3500 degrees Fahrenheit.

Pipe Line Bridges *on the* Lone Star System

(Continued from Page 19)

between piers, the 12-inch I-floor beam extends three feet past the bridge railing for a pipe support, which with a support by means of a concrete extension at each pier, gives the pipe line support every 35 feet. The 18-inch solid-welded line on this bridge is on the outside of the bridge railing, so it does not in any manner interfere with traffic. There are expansion joints on each end of this bridge in the horizontal plane. Space and supports have been provided on the other side of the bridge in case a second line is required across this bridge in the future. The steel work of this bridge and the pipe line are painted with aluminum paint which makes a very attractive and clean looking bridge and pipe line.

Figure 7 shows an airplane picture of the Red River at the Byers Bridge. Just a little to the right of the center of the picture can be seen the north end of the pipe line bridge. In the lower right hand corner can be seen the Byers toll bridge. It can also be seen that the north bank, up stream from the north end of the pipe line bridge, (to the left looking at the picture) has been cutting back. This condition became quite serious. In fact during one rise of the river, about 500 feet of the north bank, some 2,000 feet up stream from the bridge, caved off into the river, and it was feared the river would cut back north of the bridge, so steps had to be taken to stop the cutting back of the north bank. Kellner jetties were installed around the north bank, from the north main pier of the bridge, up stream, for a distance of approximately 2,600 feet. These jetties are building up a sand bar behind them and have prevented any further cutting back of the bank. At the present time the north bank, beginning at the north pier, is practically straight, up stream, for a distance of approximately 2,000 feet, and we do not anticipate any further trouble from cutting back on the north bank, as the main channel is again swinging towards the middle of the river bed. Had not these jetties been installed, the river undoubtedly would have changed its course to a point north of both pipe line bridge and highway bridge, where it apparently was ages ago, leaving both bridges high and dry on the south side of the rver.

As it was stated in the beginning of this article, sand rivers are ever changing in their habits and must be watched continuously.

Many Improvements Called *for on* 1928 Budget

THE Pacific Gas and Electric Company's construction and maintenance budget for 1928 for additions and betterments to plants involves expenditures in excess of $22,500,000.

Among the principal activities in the gas department will be: The laying of a 16-inch high pressure main from San Francisco to San Bruno; additional gas generating equipment at Vallejo; additions to the San Rafael gas plant; completion of 28 miles of high pressure main from a point on the Marysville-Oroville line to Chico; additional equipment for the Grass Valley plant; rebuilding of part of the Stockton plant, and the installation of added facilities at Monterey.

The major items by divisions are as follows:

COLGATE DIVISION

Marysville: The installation of a compressor at the Marysville plant, $20,000. Of the $71,875 to be expended for gas distribution facilities in Marysville and vicinity will be an item of $50,000 for four miles of 8-inch high pressure main from the Marysville plant to the Sutter County Hospital.

Oroville District: $48,200 will be expended in the Oroville district for new mains and services.

Colusa: $15,675 will be expended for additions to the Colusa gas plant and distribution system.

DE SABLA DIVISION

Chico: Installation of new equipment at the holder station at Chico; $19,000 for the extension and replacement of mains.

DRUM DIVISION

Grass Valley: $10,000 for a new holder at the Grass Valley plant; $6,500 for additional boiler capacity; $7,055 for extension and replacement of mains.

Roseville:$19,500 for new mains and services at Roseville.

EAST BAY DIVISION

Oakland: $187,000 for additional facilities at the Oakland plant; 9,700 feet of 16-

inch, semi-high pressure main will be laid; $40,000 for 13,400 feet of 6-inch high pressure main from Hayward to a point on the Niles Road west of Tennyson; $40,000 for the installation of a 200,000 cubic foot holder in the territory south of Hayward.

The sum of $250,000 will be expended for the extension of new mains throughout the East Bay cities to take on new business.

NORTH BAY DIVISION

San Rafael: $116,800 for additional plant facilities including the installation of two 250 horsepower boilers and housing, a steam-driven compressor with a capacity of 162,000 cubic feet per hour; $79,000 at San Rafael and vicinity for the extension of mains to provide for new business in the territory now served and the extension of mains.

Petaluma: $104,500 for extension of mains.

Santa Rosa: $99,420 for additions and betterments at Santa Rosa.

Napa: $13,350 will be expended for additions and betterments.

Vallejo: It is planned to install two new gas generating sets with miscellaneous equipment involving an expenditure of $250,000; $48,750 for extension of mains and distribution facilities.

SACRAMENTO DIVISION

Sacramento: $60,500 for additional facilities at the Sacramento plant; $203,000 for replacement of mains and the installation of new mains to take on additional business; 70,000 feet of new main will be laid to take on new consumers.

Yolo District: $13,640 for new mains.

SAN JOAQUIN DIVISION

Lodi: $18,700 for extension of mains.

Stockton: $171,500 for changes in the gas plant and $111,100 for replacement and extension of mains in and about Stockton; 45,000 feet of new main will be laid to take on additional business; $25,000 for the installation of a new 100,000 cubic foot holder.

SAN JOSE DIVISION

San Jose: $37,600 for the San Jose gas plant; $292,180 for new mains and additional distribution facilities in San Jose.

Los Gatos: $25,000 for the installation of a 100,000 cubic foot holder at Los Gatos.

SHASTA DIVISION

Redding: $16,000 for the Redding gas plant; $13,125 for replacement and extension of mains.

Red Bluff: $4,500 for additional plant facilities and $6,000 for extension of mains at Red Bluff.

WESTERN STATES GAS AND ELECTRIC COMPANY

Eureka: $19,000 for additional mains to take on new business, additional plant facilities.

COAST VALLEYS GAS AND ELECTRIC COMPANY

Salinas: $8,000 for additional facilities at the Salinas plant; $20,000 for additional distribution facilities.

Monterey: $49,000 for additional facalities at the Monterey plant with $34,450 approved for additional distribution facilities at Monterey.

ANOTHER LINE TO DAKOTAS

In addition to its projected gas line to Fargo, the Montana-Dakota Power Company is also reported to be planning a line into the Black Hills of South Dakota to supply Rapid City, Lead, Spearfish and adjacent towns with natural gas from the Hidden Water gas field south of Baker, the line to be nearly 200 miles long with 40,000 population to be served.

Testing *for* Natural Gasoline Content

(Continued from Page 21)

100 per cent. It is a fact that the further a test diverges from this, the greater the discrepancy from perfect distribution among the lessees With both very high and very low gasoline content gas going into the same plant, basing upon a test that shows 66 per cent of that test, the apportionment is at its worst. From some of that gas practically all its gasoline is extracted, and at least 34 per cent or ⅓ is not extracted from the balance.

Assuming that we have accepted the 30 pound-32° distillation test, a curve can now be plotted.

In running the tests, two factors must be constant, i. e.: using a ¾ inch x 30 inch tube with the same amount of charcoal each run, and cutting the test at the top of the fourth rise. The curve could be compiled under other constant factors, but in this case it shows the result under proposed standard conditions.

Plotting as in figure 3, with both coordinates log scale, and plotting G/M on one scale and corrected cubic feet on the other, the result is the straight line shown. This curve is handy in that it gives the content immediately By applying after distillation it shows whether the test was good, that is, whether the charcoal was in good condition, and the measurement correct. Even though on running duplicate tests the same content is obtained on each, both may be in error. By means of this curve the error may be readily detected. A great amount of money is distributed to the lessees on the outcome of these tests, so the value of the result cannot be stressed too much.

Aside from actual gasoline distribution, the plant operator often desires to know how his plant is extracting, or in other words the gasoline content of the discharge gas. Figure 4 shows a curve of the content against the footage run, and also the saturation obtained under the same condition. This gas is in the same field as that on which the intake test above mentioned was made. In this case the gas is made up of fractionator as well as the vapors not picked up by the absorbers. The proportion of the light hydrocarbons to the heavier gasoline hydrocarbons assumes an entirely different form from that in intake gas. The highest content comes at 1.5 times the fourth rise. The saturation at the highest point is 9½ per cent, and at the fourth rise, 7 per cent. With an intake gas the fourth rise gives a saturation around 15 per cent. Weathering the residue from this test stopped at the fourth gives less than .1 G/M, a very heavy weathering due to the high percentage of lighter vapors. This is why with a test of this nature the result is not comparable directly to the intake gas of the same plant.

The entire problem of testing, as the foregoing discussion indicates, is very involved, and as a consequence it is difficult to arrive at a testing method equitable to all.

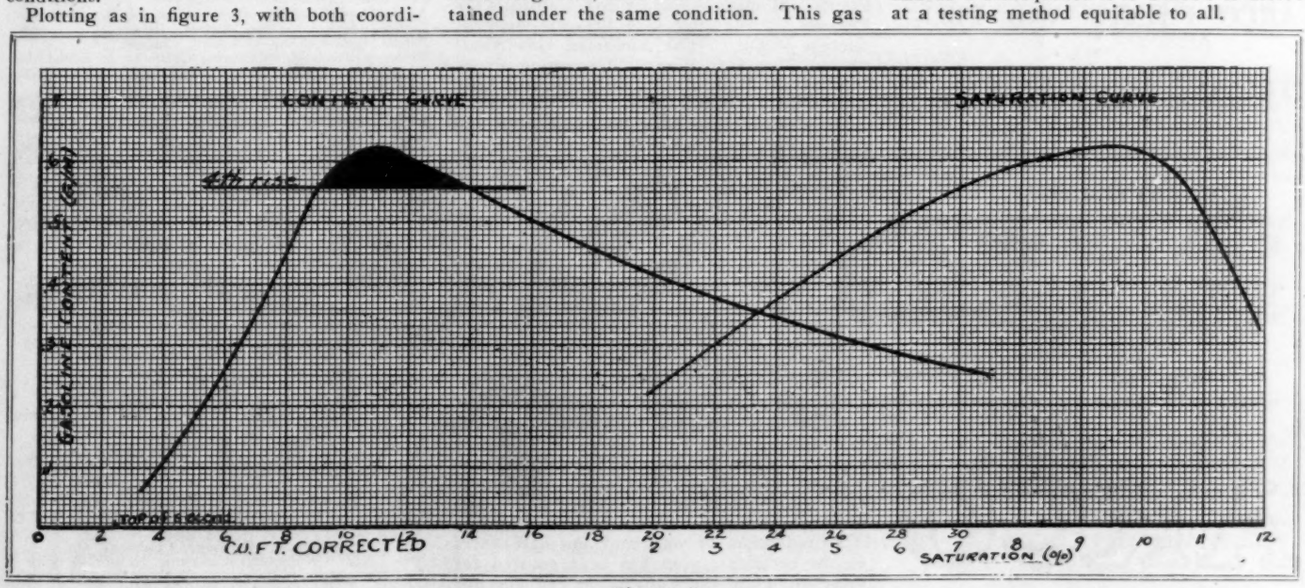


Figure 4

ARCO NEVER MADE A "FAIR-WEATHER" PAINT . . . AND NEVER WILL. WE BELIEVE THAT ONLY TOUGH PAINTS WILL DO FOR TOUGH JOBS. NO DOUBT THIS IS THE REASON WHY MORE AND MORE MAINTENANCE MEN WHO DEMAND LASTING PROTECTION ARE SPECIFYING ARCO PAINTS AND PROTECTIVE PRODUCTS.

THE ARCO COMPANY
CLEVELAND, OHIO

Pacific Coast Branch:
523 Rialto Bldg.,
San Francisco, Calif.

(147)

ARCO

Paints . Varnishes . Enamels . Lacquers

Manufacturers Building, where Dallas convention exhibits will be located

Dallas *and* Texas *are* Ready

(Continued from Page 25)

sufficient space for the serving of daily luncheons to the delegates. These luncheons will be complimentary.

The prospectus on the booths was sent out to manufacturers on February 15th and allotment of space was made one month later. Demand for the booths has been great and a large percentage of them have been reserved. They range in price from $60 to $100.

The exhibitors may begin to install their exhibits on May 2nd and must have them in place by 9 a. m. Monday, May 7th, the opening day of the Convention. The building will be open each day from 9 in the morning to 6 at night.

The Convention program is to be one of interest to every gas man, whether he be executive, engineer, commercial man or what not. Among the subjects selected for papers are the following: "Gas Sands of South Texas," "Sale of Gas to Large Industrial Plants," "Limiting Factors for Natural Gas Projects," "Adapting Gas Pressure to Production of Oil," "The American Gas Association Blue Star Plan," "Accounting Problems of the Natural Gas Industry and Natural Gas Rates."

On the night of May 8th, a smoker entertainment and informal vaudeville show will be held in the Junior Ballroom of the Adolphus Hotel to which all delegates are invited. Some of the best singers and dancers and vaudeville artists of the Southwest have been procured for this program.

The annual banquet will be held on the night of May 9th. Governor Dan Moody of Texas and the Texas State Railway Commissioners, as well as officials from the surrounding states, have been invited to this affair. Among the honor guests who are expected to be in attendance are Colonel O. H. Fogg, president of the American Gas Association; Major Alexander Forward, managing director; and B. J. Mullaney of Chicago, vice-president, of the same organization; and N. C. McGowen of Shreveport, chairman of the National Gas Department.

A reduction of one and one-half fares on the certificate plan has been secured for those attending the Convention and also for members of their families. The delegates are urged to request certificates at the time tickets are purchased as this is the only means whereby the reduction can be obtained. These certificates will not be kept at all stations, but the agents will supply the necessary information as to where they can be secured. Delegates are also urged to see an indorsing officer as soon as their destination is reached, for unless properly identified in this way the reduced fare for the return trip will not apply. It is understood that the reduced fare on the return trip is contingent upon there being an attendance of at least 250 delegates who hold regularly issued certificates obtained from the ticket agents at the starting points. The selling dates of the tickets are May 3rd to 9th, with May 14th as final return limit..

Following is the latest available list of companies having taken exhibit space for the Dallas meetings:

The Arco Company, Cleveland, Ohio
American Schaeffer & Budenberg Corp, Brooklyn, N. Y
A. B. Stove Company, Battle Creek, Mich.
Barber-Greene Company, Aurora, Ill.
Barco Manufacturing Company, Chicago, Ill.
Bridge & Beach Manufacturing Company, St. Louis, Mo.
Birmingham Stove & Range Company, Birmingham, Ala.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
Chaplin-Fulton Manufacturing Company, Pittsburgh, Pa.
Columbus Heating & Ventilating Company, Columbus, Ohio
Geo. M. Clark & Co., Div. Amer. Stove Co. Chicago, Ill.
The Continental Supply Company, St. Louis, Mo.
The Connersville Blower Company, Connersville, Ind.
Clark Bros. Company, Olean, New York
Cleveland Gas Burner & Appliance Company, Cleveland, Ohio
Crane Company, Chicago, Ill.
The Cleveland Trencher Company, Euclid, Ohio
S. R. Dresser Manufacturing Company, Bradford, Pa.
Dangler Stove Company, Div. Amer. Stove Co., Cleveland, Ohio
Detroit Jewel Gas Ranges, Detroit, Mich.
Detroit Stove Works, Detroit, Mich.
The Estate Stove Company, Hamilton, Ohio
The Foxboro Company, Foxboro, Mass.
Fisher Governor Company, Marshalltown, Iowa
General Gas Light Company, Kalamazoo, Mich.
Gillespie & Schwan, Inc., Houston and San Antonio, Tex.
Guardian Gas Appliance Company, Cleveland, Ohio
W. K. Henderson Iron Works & Supply Company, Shreveport, La.
Home Incinerator Company, Milwaukee, Wis.
Hope Engineering Company, Mt. Vernon, Ohio
International Business Machines Corp., New York City
Kernit Incinerator Company, Ampere, N. J.
The Lattimer Stevens Company, Columbus, Ohio
The Linde Air Products Company, New York City
The Lunkenheimer Company, Cincinnati, Ohio
Michigan Stove Company, Detroit, Mich.
Mid-West Incinerator Corp., Chicago, Ill.

Moore Bros. Company, Joliet, Ill.
Mueller Company, Decatur, Ill.
Lee B. Mettler Company, Los Angeles, Calif.
Metric Metal Works, Erie, Pa.
National Tube Company, Pittsburgh, Pa.
National Supply Company, Toledo, Ohio
New Process Stove Co., Div. Amer. Stove Co., Cleveland, Ohio
Ohio Foundry & Manufacturing Company, Steubenville, Ohio
Oil Well Supply Company, Pittsburgh, Pa.
Pittsburgh Equitable Meter Company, Pittsburgh, Pa.
Pittsburgh Water Heater Company, Pittsburgh, Pa.
Payne Furnace Company, Los Angeles, Calif.
The Ridge Tool Company, Elyria, Ohio
Reliable Stove Company, Div. Amer. Stove Co., Cleveland, Ohio
Robinson Orifice Fitting Company, Los Angeles, Calif.
George D. Roper Corporation, Rockford, Ill.
R. S. Manufacturing Company, Dallas, Texas
Sala Heater & Mantel Company, Dallas, Texas
Servel Sales, Inc., Evansville, Ind.
M. B. Skinner Company, Chicago, Ill.
J. B. Slattery & Bro., Inc., Brooklyn, N. Y.
Southwestern Pipe Joint & Engineering Company, Birmingham, Ala.
Spencer Thermostat Company, Cambridge, Mass.
Sprague Meter Company, Bridgeport, Conn.
Troop Water Heater Company, Pittsburgh, Pa.
Victaulic Company of America, New York City
Wailes Dove-Hermiston Corp, Tulsa, Okla.; Houston, Tex.
Ward Heater Company, Los Angeles, Calif.
Walworth Manufacturing Company, New York City
Webster Engineering Co., Tulsa, Okla.
Westcott & Greis, Inc., Tulsa, Oklahoma
Westcott Valve Company, East St. Louis, Ill.
Western Gas, Los Angeles, Calif.
Worthington Pump & Machinery Company, Buffalo, N. Y.
W. K. M. Company, Houston, Texas

NEW ACTING SECRETARY FOR SOUTHWEST DIVISION

William C. Grant, director of the Texas Public Service Information Bureau, has been appointed acting secretary of the Southwest Division, Natural Gas Department, American Gas Association, succeeding George McQuaid, who died March 5, 1928.

Wm. C. Grant

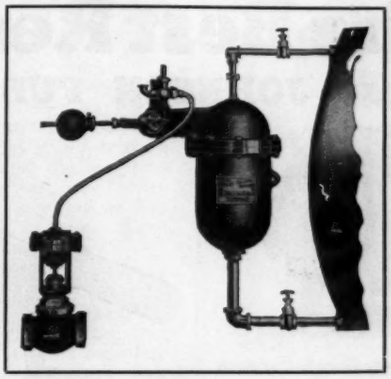
Mr. Grant also succeeded Mr. McQuaid as director of the Texas Information Bureau last June, when Mr. McQuaid became director of public information for the Central and Southwest Utilities Company.

The new acting secretary of the Southwest Division has a background of more than 15 years newspaper experience. He was state editor of the Associated Press in Texas just prior to taking the directorship of the Texas bureau. He formerly was in charge of the Associated Press bureau at Austin, Texas, the capital, and was with the A.P. in Springfield, Ill, and in San Francisco.

He is a graduate in law from Washington University, St. Louis, and attended the University of Illinois two years. In addition to his experience with the Associated Press, he has worked on a number of papers throughout the country, including papers in Illinois, the St. Louis Globe-Democrat and the San Francisco Examiner.

HOLDER REPAIR SUBJECT OF NEW A. G. A. STUDY

A special committee has been created by the executive board of the American Gas Association to prepare recommendations as to practices in conducting repair work on gas holders. J. B. Klumpp, vice-president of the United Gas Improvement Company, Philadelphia, Pa., and past president of the American Gas Association, is chairman of the committee.



Dependable—of course

The Vigilant Liquid Level Regulator, by remote control, is designed to maintain a constant oil level in both the absorbing tank and the still, where gasoline is manufactured by absorbing the gasoline in oil and subsequently separating it from the oil by distillation.

This regulator will accommodate itself to any type of absorber or steam still, and maintain a constant oil level under pressure.

Thirty-five years of successful experience in the manufacture of regulators assure to the purchaser absolute accurate and reliable equipment.

Write for Catalogue

The Chaplin-Fulton Mfg. Co.

Organized 1884—Oldest Builders of Gas Regulators in the Country. Built in all Sizes From 1 Inch to 24 Inches; For All Service. 1 oz. up to 1,600 lbs. Pressure to Square Inch.

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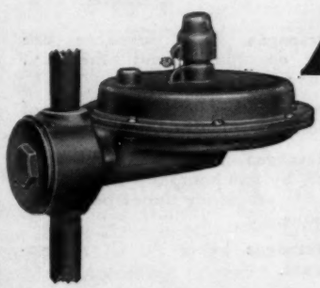
MODEL 10 SERIES
With or Without Mercury Seal



Spring Type
Also furnished in Dead Weight Type

Reynolds Gas Control Since 1892

Products for all kinds of Pressure Reduction—for either artificial or natural gas.

GOVERNORS — Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

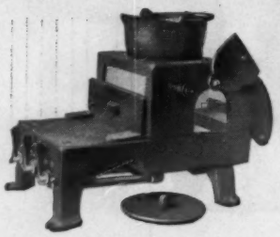
REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.

VALVE—Automatic Quick Closing Anti Vacuum.

REYNOLDS GAS REGULATOR COMPANY
Anderson, Indiana

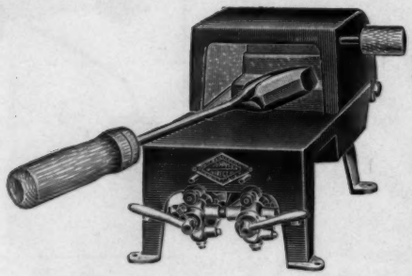
Get the Best Results!

Use these JOHNSON FURNACES!



No. 118 Combination Bench Furnace

Look as far as you may, but you will not find the equal of the Johnson No. 118 Combination Bench Furnace for economy and efficiency. Stout construction insures long life. Three famous Johnson Burners provide intense heat without a blower. Big enough to heat the largest soldering coppers. Also, designed for tempering and heat-treating. The melting pot has a 25-lb. capacity and does a quick job of melting all soft metals. Write for full details.



JOHNSON NO. 101 BENCH FURNACE

High efficiency at low cost!

This popular Bench Furnace is built to withstand long usage. Fitted with two powerful burners which provide quick intense heat without forced air blast. Scientific construction insures maximum utilization of fuel. Write for full details.

JOHNSON GAS APPLIANCE CO.
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Pacific Coast Representative—C. B. Babcock Co.
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The Cleveland Trencher Company

"Pioneers of the Small Trencher"

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There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper and the people who consider price only are this man's lawful prey.

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Electrogas floor furnaces are built on quality and efficiency, rather than on price.

Electrogas is the originator of electrically ignited gas furnaces.

Electrogas' radially finned radiator, by gas company test, shows 84.6% efficiency under poor conditions.

Electrogas bears A. G. A. approval.

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GEORGE McQUAID

THE gas industry and the public utility industry in general lost a staunch friend and a loyal supporter in the passing of George McQuaid of Dallas, Texas, who died at his home March 5, 1928, at the age of 52.

At the time of his death, Mr. McQuaid was director of public information for the Central and South West Utilities Company of Dallas, an Insull holding company, controlling companies in Texas, Louisiana, Arkansas, and Oklahoma. He had held this position just 10 months, having resigned last June from the position of director of the Texas Public Service Information Bureau. He aided in organizing this bureau and was its first director.

George McQuaid

He was widely known throughout the Southwest both for his newspaper work and his public contact on behalf of the industry with which he later became affiliated. He was at various times managing editor of the Dallas News, the San Antonio Express, the Galveston News, and the Guthrie (Okla.) Capital.

Mr. McQuaid was a native of Virginia, having been born in Alexandria. He attended Georgetown University at Washington, D. C. After leaving school, he set up a law office at San Antonio, but soon entered newspaper work.

He was buried in El Paso on the side of a mountain in accordance with a request he had once made.

The paragraph below, taken from a resolution of tribute passed by the executive committee of the Texas Public Service Information Bureau on the death of Mr. McQuaid, reveals the high regard in which he was held as a utility worker and as a man:

"The Texas Public Service Information Bureau was organized something over five years ago with George McQuaid as its first direcor. It was his broad vision of usefulness and his exuberant and inexhaustible spirit of goodwill that gave it shape, direction, stability, and a high goal of achievement. Much of the friendly understanding on the part of the people of Texas toward their public utility services can be attributed to the labors of George McQuaid, who, with a sound comprehension both of the value of these services and of the needs of the people, preached the gospel of true understanding up and down the length and breadth of this broad state."

ANNUAL MEETING, SAN ANTONIO PUBLIC SERVICE COMPANY

On February 28, 1928 the annual meeting of the San Antonio Public Service Company was held. President W B. Tuttle presented a financial statement and reviewed the important events of the year, while vice-president and general manager, E. H. Kifer listed the larger operating activities during the year. A new board of directors was elected, R. B. Brown, president of the American Light and Traction Company succeeding Alanson P. Lathrop, and also becoming chairman of the board A 1928 budget of $727,844.39 was approved for the company's gas department.

The Firing *of* Decorative Tile

(Continued from Page 23)

oil burning inasmuch as the particles are not broken up by atomization.

While fuel and the manner in which fuel is used are often thought to be responsible for many defects such as discoloration, checking, blisters, pitts, blue or black specks and other imperfections, there are other items of equal importance that deserve just as rigid an examination as that of fuel; namely: firing time, temperatures in relation to time, cooling, draft control, body materials, glazing materials, slip materials, manner of loading the kiln and kiln design.

It has been the writer's experience that no matter how strongly causes for failure seem to point toward fuel and the burning, it is advisable to have a thorough investigation made of everything in connection with the entire manufacturing process at the same time that tests are being made from a fuel standpoint.

For example, a certain tile industry was making an elaborately decorated stock tile and for months the ware came out in perfect condition. Suddenly the tiles appeared very blistered even though they were being fired under apparently the same conditions as before. Immediately a complaint was made by the manufacturer that he thought the fuel had changed, causing a somewhat reducing atmospheric condition within the kiln, and that perhaps considerable sulphur in the fuel was causing the damage.

The thought of sulphur was immediately eliminated by presenting the chemical analysis of the fuel, which in this case was natural gas. Samples of flue gases were taken and tested throughout the burning period showing the amount of carbondioxide (CO_2), oxygen (O_2), and carbon monoxide (CO) and excess air and at no time did the test show less than 20 per cent excess air. The kiln atmosphere was at all times absolutely clear.

The question was then raised as to whether there had been any change in body or glazing materials from those which had been used before the trouble occurred. An examination was made and considerable lime was found in the body material.

LIME CONTENT IS MENACE

A word or two about lime will perhaps be of interest. Lime occurs in clays in several mineral forms, as a carbonate (limestone), as a carbonate with magnesia (dolomite), as a sulphate (gypsum), as a constituent of silicate mineral and it is often a very serious menace in clay-burning operations.

Lime carbonate as pebbles burns to caustic lime, which when exposed to the weather, slacks, swells and ruptures the product. The dissociation temperature of lime carbonate is about cone 014 (1526° F.), which is lower than commercial kiln temperatures. In consequence any lime carbonate in the clay is certain to be converted into lime and "popping" follows.

Lime in small percentages in clay has little effect in most practical operations, but as the lime content increases, serious fluxing is experienced and as it becomes excessive, it acts as a refractory and carries the burning over the fluxing range.

A marked feature of lime is the color produced. A clay containing sufficient iron to burn red, will when impregnated with lime, burn to a buff, changing at higher temperatures to a yellow green and finally to a decided green. At very low temperatures, before the lime enters into the fusible mixtures in any effective degree, the color of the ware is red. This color is due to the iron and disappears when the iron begins to combine with the lime and silica as lime iron silicate, while the final green color is due to a full development of the lime iron body. Limey clay is not always satisfactory for red, buff and green facing wares, as they will quite often be streaked in color. However, there are exceptions.

In the particular case just mentioned, the tile plant owners after making the discovery of the lime in the material had an examination made of the clay where the clay had been purchased and found it to be considerably streaked with lime. A change was made to another location and the trouble was then eliminated.

Now the point is that had it not been for positive proof which was presented through results of the tests made that the fuel and firing conditions were not at fault and that the trouble was due to other reasons, a great deal of dissatisfaction, time and money might have been involved before the actual fault could have been discovered.

As the ceramic and gas industries are both expanding very rapidly their problems becoming correspondingly more intricate. Therefore, the acme of service can only be rendered for the benefit of all concerned by the closest cooperation.

In subsequent articles more will be said regarding applicable methods and suggestions for rendering satisfactory service and stimulating business for both the creamic and gas industries.

YEAR'S EARNINGS OF STANDARD GAS AND ELECTRIC GAIN 2.8%

Combined net earnings of all subsidiary and affiliated public utility companies of Standard Gas and Electric Company for the 12 months ended January 31, 1928, showed an increase of $3,190,650, or 5.3 per cent, as compared with the previous 12 months. Gross earnings increased $3,973,398, or 2.8 per cent. The figures for all companies now in the Standard Gas and Electric system compare as follows:

12 mos. ended Jan. 31	*1928*	*1927*
Gross earnings	$145,570,446	$141,597,048
Net earnings	62,888,693	59,698,042
Other income	1,642,454	1,553,088
Net earnings including other income	64,531,147	61,251,130

FILE PETITION FOR MONTANA-DAKOTA GAS CARRIER

A petition has been filed with the state authorities at Bismarck, North Dakota, for a permit to lay a pipe line for gas from the town of Beach on the Montana-Dakota line, to Fargo, by the Montana-Dakota Power company. The proposed route will follow the Northern Pacific railroad. This line is to carry natural gas from the Glendive gas field in Eastern Montana to Fargo, North Dakota, also serving the intermediate towns along the route.

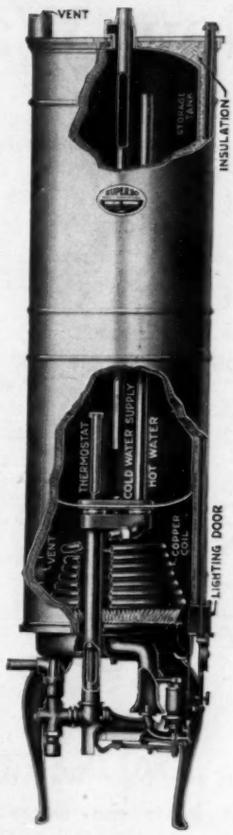
PLEASANT HILL CITIZENS SANCTION GAS

A 20-year gas franchise has been voted by the city of Pleasant Hill, Mo., to the firm of Shippey, Maddin & Parish of Kansas City, Mo. According to report, a contract for a six-inch line from Belton, the origin of the gas supply, into Pleasant Hill, has already been let to the contracting firm, Conner & Sons, of Kansas City.

SUPERBO
AUTOMATIC STORAGE WATER HEATERS

Manufactured in Los Angeles Since 1914

Superbo "Safety"



A Quality Product

FEATURING: — Dual Safety Control — Detachable Heating Unit—Safety Gas Shut-off.

No. 1—22 gallons . . . $ 97.50
No. 2—30 gallons . . . 125.00
No. 3—40 gallons . . . 150.00
No. 4—66 gallons . . . 250.00

Prices F. O. B. Factory

Manufactured by

Superbo Mfg. Co.

Los Angeles California

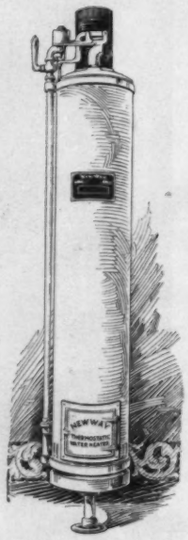
IT IS DIFFERENT
IT STARTS HOT

—

The Economy Way is the

New Way

THERMOSTATICALLY



CONTROLLED

—

In the New Way the pilot light heats the water in the coils,—always—there is no re-heating of the coils and heater every time the hot water faucet opens.

The New Way saves gas, water and time.

—

Made and Guaranteed by

New Way Manufacturing Company, Inc.

894 FOLSOM STREET
SAN FRANCISCO

NATURAL GAS GASOLINE OPERATIONS

Compiled by E. T. Knudsen

Department of Commerce, Bureau of Mines, Division of Mineral Resources and Statistics

ONE hundred and thirty-six natural-gas gasoline plants with a daily indicated capacity of 1,451,650 thousand cubic feet, reported a recovery of 38,735,840 gallons of natural-gas gasoline from 25,820,159 thousand cubic feet of gas treated in February. This is a decrease of 437 barrels in daily average production.

Utilization of natural-gas gasoline amounted to 952,625 barrels, a decrease under January of 176,218 barrels. Daily average utilization of 32,849 barrels was 1,046 barrels more than daily average production of 31,803 barrels.

Stocks of natural-gas gasoline at the end of February amounted to 551,096 barrels of which 33,168 barrels were reported by natural-gas gasoline plant operators and 517,928 barrels by refinery operators. This is an increase of 20,055 barrels over January stocks. This stock figure of 551,096 barrels is approximately seventeen days supply at the current rate of consumption.

Production of gasoline during the month of February amounted to 4,898,835 barrels, a daily average of 168,925 barrels. This is a decrease in total production of 253,419 barrels or 4.92 per cent under January output and an increase of 372,080 barrels or 8.22 per cent over the output of February, 1927.

Of the total gasoline produced, 19,577 barrels were reported as finished gasoline produced by natural-gas gasoline plant operators. Production of gasoline from Cracking Processes decreased in February to 540,195 barrels.

Stocks of gasoline show an increase of 319,723 barrels during February and at the end of the month amounted to 11,905,915 barrels. This stock figure includes 49 barrels of finished gasoline reported by natural-gas gasoline plant operators.

CALIFORNIA NATURAL GAS GASOLINE PRODUCTION, DISTRIBUTION AND STOCKS
FEBRUARY, 1928

PRODUCTION Type of Plant	Gas Treated M. C. F.	Natural-Gas Gasoline Produced (Gallons)	Gasoline Recovery per MCF Gas Treated
Oil Absorption	16,349,485	24,389,756	1.492
Compressor	245,863	288,887	1.175
Combination Comp. and Oil Absorption	9,224,811	14,036,810	1.522
Drip	----------	20,387	---- ----
Totals	25,820,159	38,735,840	1.500
Finished Gasoline produced at plants	19,577 Bbls.		

DISTRIBUTION		
Stocks First of Month		531,041 Bbl.
Production during Month		922,282 "
Quantity Mixed with crude or unfinished oils	202,278 Bbl.	
Used in Blending at Refineries	743,399 "	
Stocks End of Month	551,096 "	
Used at Plants, Shortage and Evaporation Losses	6,948 "	
Balance		50,398 "
	1,503,721 "	1,503,721 "

STOCKS				
Natural-gas Gasoline held by Natural gas Gasoline Plant Operators	1,393,072 Gals.	or	33,168 Bbls.	
Natural-gas Gasoline held by Refiners	21,752,976 "	"	517,928 "	
Totals	23,146,048 "	"	551,096 "	
Finished Gasoline (Motor Fuel) held by Natural-gas Gasoline Plant Operators			49 Bbls.	

CITIES SERVICE COMMON STOCK OFFERED PRESENT HOLDERS

Registered holders of Cities Service Company common stock as of record at the close of business March 28, are receiving rights to buy additional shares in the ratio of one new share for each ten now held, at a price of $45 per share, with Cities Service common now selling at approximately $58 per share on the market. This option must be exercised on or before April 17, 1928. Funds provided will be used for new construction and addition to company property.

APPLICATION MADE TO EXTEND SERVICE TO SIX COUNTIES

The public service commission of Kansas has received an application from the Kansas Pipe Line and Gas Company for permission to extend a natural gas pipe line into six additional central Kansas counties, namely: Marion, Dickinson, Erie, Waubunsee, Riley, Pottawatomie. At the present time the company is authorized to operate in McPherson, Saline and Reno counties. In the additional counties it proposes to supply gas to Abilene, Chapman, Junction City, Fort Riley, Manhattan, Herrington, Wamego, St Marys and St. George.

MORGAN INTERESTS PLAN TO SERVE ADDITIONAL TOWNS

The S. R. Morgan gas interests of Muskogee, Oklahoma, which recently purchased the controlling interest in the C. N. Haskell gas companies, contemplate extending gas service to Dow, Haileyville, Gowen, Wilburton and Red Oaks in southeastern Oklahoma, according to report. Both the above company and the Muskogee Industrial Gas Company are seeking the franchise rights to serve gas to Muskogee.

Selling *to* Build Hotel *and* Restaurant Load

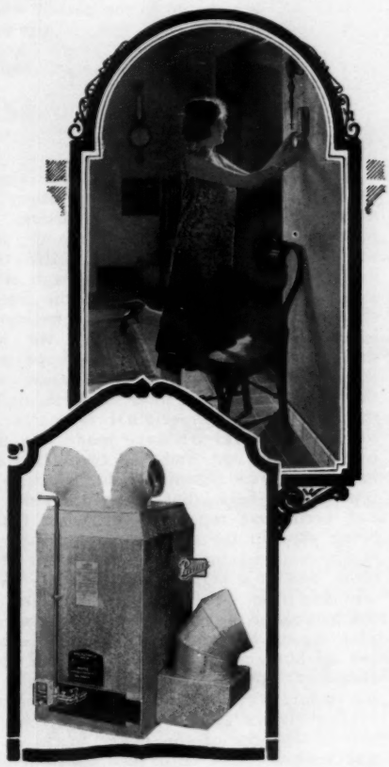
he has to reline his fire boxes, buy new decks for the ranges; he has his oil motor to maintain; keep it in repair, with servicing expense, etc. When all those factors of maintenance operation and servicing, and the life of his range, are taken into consideration and added onto the cost of his oil bill, then the prospect really arrives at what it costs him to run that oil range, on a basis comparable to the net gas bill now. By making such cost analysis we can progress in the sale of gas equipment where it involves taking out oil or coal or in some cases, merely holding and maintaining existing gas business in the face of aggressive oil burner competition.

Our direct selling of equipment to consumers who are now using oil, coal, or obsolete gas equipment, we call replacement and conversion activity. Here we confess another weakness. Considerable experimentation in re-designing oil ranges, so that when properly insulated, and with the fire boxes rebuilt, gas could be burned in them, convinces us that it does not work satisfactorily. We have been more successful in the conversion of coal ranges than oil ranges, and have a few jobs which are fairly satisfactory. It may be possible for us to make such conversions, but it is obvious that they are never as satisfactory as are the efficient modern heavy duty gas ranges. Often when such conversions are attempted water coils are found in the ranges, and the owners do not like to remove them and put in a good gas water heater. They want a gas burner installed which will do all the cooking and water heating, and this introduces difficulty in competition that does not work out. So conversion sales in our experience we will confess do not work

"LEASE RENTAL" SALES

Replacement sales have been satisfactorily made. Last year we obtained 36. That may not seem a very large number, in view of our 3000-odd accounts in that class, but considering competition and the fact that we have just started out on a direct basis to go after that type of business it may be regarded as a creditable showing. We were tempted to consider a rental proposition on the equipment, but upon further consideration we saw where that might lead to embarrassment with the equipment houses which were trying to make legitimate sales. It appears to us that it would be a bad precedent to set to rent hotel and restaurant equipment, though there may be advantageous features to the plan. However, we compromised on what might be considered the equivalent to a rental scheme which we call a lease rental proposition. We collect a small down payment, 15 or 20 per cent, and then the balance is 8 per cent a month. That throws it over a period of approximately three years. We have found that with the lease contract, that that proposition has practically all of the advantages of any ordinary rental proposition plus the added advantage that the prospect considers that he is buying something—as he is—and meanwhile the gas company gets the revenue.

The selling asset lies in the fact that the average prospect, operating on a lease, does not have $1,000 cash in the bank with which to pay in full for a complete installation. On the other hand, if we can come to him and put the equipment in on easy terms and give him three years to pay for it, those payments do not amount to any more than the maintenance and repairs and service ex-



14
Years

After Fourteen years of scientific research and experience in the manufacture and installation of Gas Fired Warm Air Furnaces we have developed a product that the gas industry can depend upon to give maximum performance and efficiency.

Unit Furnaces

Payne Furnaces have been given the highest award possible in the United States by being approved by the American Gas Association Laboratory.

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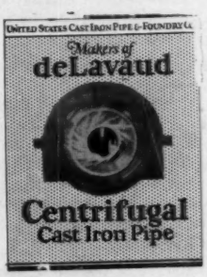
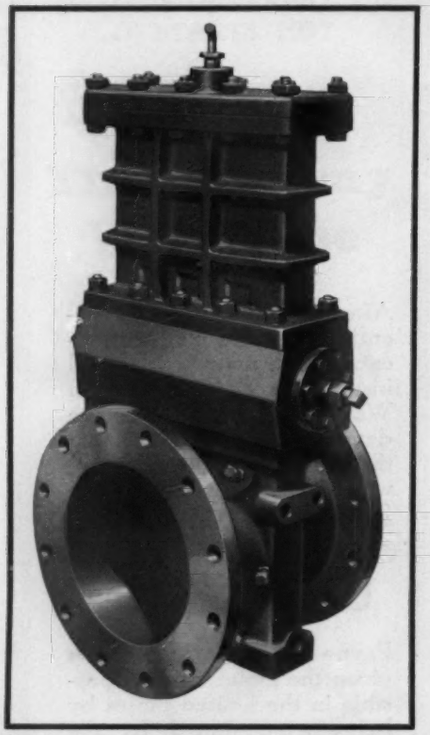
Cast Iron Pipe and Fittings
for All Purposes
High and low pressure pipe for Gas Service



United States Cast Iron Pipe and Foundry Company
General Offices: Burlington, New Jersey
Sales Offices
San Francisco, Pittsburgh, Dallas, Kansas City, Cleveland, Philadelphia, Chicago, Birmingham, New York, Buffalo, Minneapolis

OVER 8500 IN USE



This Single Unit

. . . takes the place completely of the cumbersome, old style, orifice meter bypassing arrangement. It eliminates by-pass valves, flanges, pipe, fittings, etc. Assures better metering. No hazards or gas losses. Many other advantages.

Write today for new catalog giving complete details and prices.

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Mid-Continent Distributors:

B & A Specialty Co., Tulsa, Houston
Westcott & Greis, Inc., Tulsa, Dallas

ROBINSON ORIFICE FITTING
TRADE MARK

pense on his old-type oil equipment.

So much for those activities with respect to new jobs and replacement jobs.

SELLING AIDS

Finally, with respect to selling aids,—we use the hotel and restaurant magazines considerably. The editors of these magazines have a great many valuable contacts with restaurants, with chefs, etc. and they are a source for tips. For instance, a new hotel is being built. We find out who is going to get the lease on the hotel, whether this party will sub-lease the kitchen and, if so, to whom Then we go to the person who is going to lease the kitchen and get him to go to the owner and specify gas. So, you see, the hotel and restaurant magazines are an asset.

Direct-by-mail advertising can be used and a list of prospects may be built up through that method.

Our most effective selling has been through the use of photostatic copies of about 100 testimonial letters from satisfied users. We have selected representative and well-known kitchens. In addition to these testimonial letters we have a photograph of the exterior of the building and of the interior of the kitchen. Supporting these testimonial letters and these photographs we have sample cost analyses which we have made for various prospects and we show what the actual gas sales have been to support the cross-check the original estimates and cost analyses that we have made. In these cost analyses we find, in trying to cash in on our great potential field, which is the replacement field, that the vulnerable spot has been that regardless of what fuel is being used in the main ranges, a little gas is always used for the coffee urn or steam table, and at a higher rate schedule. When we add the prospect's present gas bill for gas under the coffee urn and steam table, plus the oil bill and electricity in operating the oil burners, and the maintenance operation, etc., and then compute what the gas bill would have been if gas had been used exclusively, in such a cost analysis he gets the advantages of the lower blocks in the gas kitchen. Not until such an analysis is made does the prospect realize that in the operation of his kitchen he is buying gas at the higher rate of 80c or 90c a thousand, whereas if he had a complete gas kitchen he could get it for an average of 60c or 70c a thousand.

Our primary objective in this activity has been that of obtaining the revenue. The consideration of who sells the equpiment is secondary. If it is possible to have the equipment houses sell the appliances then we work it through the equipment houses. If they cannot meet the situation it is for us to sell direct to replace oil and coal.

ABSTRACT OF DISCUSSION

The discussion of this paper brought out that the sale of restaurant equipment is specialty selling and cannot be profitable from a merchandise standpoint. The character of the load developed is, however, so attractive that the company is justified in subsidizing the sale of the equipment.

C. B. BABCOCK (San Francisco) said that the hotel and restaurant equipment house is the natural agent for making these sales as it handles everything necessary for the complete kitchen. It is, however, important that the gas company be active in the field, either through cooperation with the equipment house or otherwise, in order that gas be recognized, and in order that gas installation be properly serviced.

J. E. DAVIES (Chicago) said that the Chicago company considers restaurant business extremely attractive and maintains an efficient staff to sell it, including men who can draw up complete plans for the kitchen layout. A 24-hour maintenance department makes monthly inspections of appliances and services them at hours when the equipment is not in use. The company works with both the prospect and the equipment house and no effort is made to sell appliances direct, provided the equipment house will sell gas equipment. Ordinarily small jobs are sold and connected by the gas company and big jobs by the equipper.

FLOOD WATERS TAKE OUT GAS LINES IN SO. CALIFORNIA

WITH the appalling toll of human life and property damage taken by the flood waters from the St. Francis dam, which went out on March 13 and released 12,000,000,000 gallons of water to sweep along the course of the Santa Clara River in southern California, came a correspondingly severe test on gas utility service. Lines of the Southern Counties Gas Company, Southern California Gas Company and Ventura Fuel Company were all affected, though the Ventura Fuel lines received but slight damage.

At Kemp station the Southern Counties 12-inch line over the Santa Clara River went out, some 950 feet being lost at this break. There were also two breaks in the same line between this point and Ventura, one of 600 feet and one of 200. Breaks occurred in four other lines of the Southern Counties in Ventura County.

Two of the Southern California Gas Company's 12¾-inch lines, from Taft, went out just north of Castaic Junction, and one 12¾-inch line from Ventura was washed out in five or six places between Piru and Castaic Junction Possibly 7,000 feet of line were lost altogether by Southern California Gas Company.

Sixty million cubic feet of gas a day were being delivered to Los Angeles metropolitan area by the lines involved in the flood damage. Industrial consumers were switched to fuel oil, and runs of oil gas were made for brief intervals, to make up the deficiency.

Fortunately for continuous gas service, the Ventura Fuel Company line remained in and operated at full capacity, enabling the distributing companies to continue with a minimum of service interruptions, by interconnection with the Ventura Fuel supply. With the exception of a broken drip at the Saticoy Bridge, the Ventura Fuel line escaped without damage.

The St. Francis Dam went out shortly after midnight, the morning of Tuesday, March 13th, and emergency repair crews of all the gas companies involved were in action soon thereafter, highly commendable work being done in the face of extremely unfavorable conditions. Materials for emergency lines had to be brought in by motor truck over roads which were unsafe for travel, and some of the force of men were on duty as long as 58 hours at a stretch.

KEILLOR DUE TO RETURN AFTER TRIP TO ENGLAND

J. Keillor, gas engineer for the British Columbia Electric Railway Company at Vancouver, B. C., was due to return to his office towards the end of March. Mr. Keillor has been away in the Old Country for the past three and one-half months on business for his firm.

GAS NOW IN PRAGUE

Gas was officially turned on in the mains of Prague, Okla., on March 2nd.

SEE JUNE 15 AS COMPLETION DATE ON DENVER LINE

Probable dates for the completion of the Texas-to-Denver natural gas line have again been advanced, June 15 now being set as completion date providing weather conditions and other factors remain favorable.

Two-thirds of the 340-mile project had been completed in March, according to E. G. Hill, vice-president of Ford, Bacon and Davis, the constructing firm in charge of operations. The portion of the lines from Amarillo, Texas, to Clayton, New Mexico, a distance of 87 miles, is expected to be completed easily by May 1 by the Oklahoma Construction Company, sub-contractors on that section; and the Denver-Clayton end of the project, which is in the hands of Williams Bros., Inc., should be finished by June 1st, weather conditions permitting. This is two and one-half months earlier than the pipe line schedule originally called for.

Another world's record fell, according to the construction company's executives, when on March 13 a crew of 90 men on the southern portion of the line laid 12,000 feet of 22-inch pipe.

Work is well advanced on the booster station which is being constructed at Amarillo as a precaution against future decrease in gas pressure. Three other compressor stations will eventually be erected, as need for them develops, one at a point on the north banks of the Purgatoire Canyon in Colorado, one at a point east of Pueblo near Devine and one at a third point near Clayton, New Mexico.

LONE STAR BUYS WALTERS CO.

The Lone Star Gas Company of Dallas Texas, has purchased the Walters, Okla., Gas Company, distributors of gas in that city, and plans improvements over the system, which will include the laying of new lines. The Walters Company was owned by the McBride interests of St. Louis.

PUEBLO ELECTION

Tax paying voters of Pueblo, Colo., will go to the polls on April 6 to pass on the proposed franchise on rates for natural gas to be served by the Pueblo Gas & Fuel Company. Beginning of the $380,000 gas main improvement program in Pueblo is delayed pending the outcome of the election, according to A. M. Talbot, manager of the gas company.

SAN DIEGO COMPANY GAINS 2300 GAS USERS

During 1927 there were 2300 gas consumers added on the lines of the San Diego Consolidated Gas and Electric Company, according to A. E. Halloway, superintendent of the utility's commercial department.

WEST TEXAS EXTENSION

The West Texas Gas Company, according to report, plans to extend its lines to Levelland, Texas, county seat of Hockley County. Application has been made at Levelland for a gas franchise. The line will run from Amarillo to Herford and Clovis, southeast through Muleshoe, Amherst, Littlefield, and south to Levelland, then to Meadows, Brownfield, Seagraves, Seminole and on to Midland, making connections with the Plainview, Lubbock and Lamira line, thereby forming a complete circuit.

Gas will be available in Midland by June 1st, according to announcement of the company. The West Texas Company is a subsidiary of the Prairie Oil & Gas Company.

The service demands of modern industry are readily fulfilled by the FLUOR organization.

Delayed operation or shut-downs often cost thousands of dollars through loss of production.

The FLUOR factory is equipped with modern machinery producing standardized parts. Shipments from stock and rapid erection facilities effect all possible savings in meeting emergency demands.

Jackson Engineering & Equipment Co.

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502 National Bank of Commerce Bldg., Tulsa, Oklahoma
707 Dallas National Bank Bldg., Dallas, Texas

FLUOR REDWOOD COOLING TOWERS

Chas. C. Moore & Co. Engineers, Inc.

CONTRACTORS FOR COMPLETE PLANTS

High Grade Machinery

The Babcock & Wilcox water tube boilers
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Vancouver, B. C., Standard Bank Bldg.

$2,000,000 BOND ISSUE SOLD BY SOUTH TEXAS GAS CO.

A $2,000,000 bond issue of the South Texas Gas Company has been purchased by C. E. Barrett & Company of New York. The issue is dated March 1, 1928 and matures March 1, 1938. It is composed of first mortgage and collateral 6½ per cent gold bonds. The South Texas Company has recently been acquired by the Moody & Seagraves interests.

INDEPENDENCE CHARTER

A charter has been granted to The Home Natural Gas Company of Independence, Kans., by the state of Kansas charter board. The incorporators are C. E. Roth, W. D. Farout, Mayme Farout, Edna F. Roth and H. D. Kors of Independence. Capitalization was $400,000.

WILLISTON FRANCHISE RESTS WITH VOTERS

Work on the proposed gas line from Glendive, Montana, to Williston, North Dakota, is waiting on the coming election in Williston when the voters of that community will pass on the matter of giving a franchise to the Montana-Dakota Power company.

TO OPPOSE PIPING GAS OUT OF LOUISIANA

The Commission Council of New Orleans has empowered City Attorney Cahn and a committee of prominent New Orleans attorneys to draft a bill which will be submitted to the next Legislature providing that no natural gas be piped out of the State of Louisiana. The purpose of the bill is to insure the city a permanent supply of natural gas, it is announced.

FRANCHISE LET FOR BURTON

The city of Leroy, Kansas, has granted a gas franchise to Loyd L. Burton. The franchise is for a period of 20 years and stipulates either natural or artificial gas. The rate provided for is one not to exceed 50 cents per 1000 cu. ft. with a minumum charge of 50 cents a month. By it, the gas company will pipe the gas to the curb and the consumer will pipe it from the curb to the house. Free gas will be supplied the official city buildings.

71% OF GAS FOR DOMESTIC USE IN MISSOURI

According to the Missouri Committee on Public Utility Information, 71 per cent of the gas sold in that state last year was for domestic purposes and 29 per cent for industrial use.

CAR LOAD REGULATOR ORDER

A record-size order for gas regulators, consisting of an entire car load lot, has been placed by the Stamford-Western Gas Company of Stamford, Texas. The order was entered through Westcott & Greis, representatives for the Reliance Manufacturing Company of Alhambra, California.

DALLAS OFFICE

The Ward Heater Company of Los Angeles has opened a district office in Dallas, Texas, with E. M. Reis in charge. Smauel Sproat, president of the Ward Heater Company, has been advised that their product has just been awarded the Blue Star by the American Gas Association Laboratory.

TWENTY-FIFTH ANNIVERSARY FOR OKLAHOMA G. & E. CO.

The Oklahoma Gas and Electric Company celebrated its twenty-fifth jubilee last month by inviting the public to inspect the new general office building in Oklahoma City, which was dedicated just 25 years to the month from the time when the Oklahoma Gas and Electric Company originated in Enid, Okla.

INDUSTRIAL CONTRACTS

The United Gas Service Company, which has assumed the industrial and domestic distribution of gas along the 285 mile 20-inch line of the Empire Company from Amarillo, Texas, to Wichita, Kansas, has already secured forty industrial contracts in and near Alva, Oklahoma.

B. C. ELECTRIC HOME SERVICE ENTERTAINS STUDENTS

The gas department of the British Columbia Electric Railway Company recently entertained the domestic science classes of the Technical and High Schools of New Westminster at a gas cooking demonstration. The demonstration was in charge of Miss Isabel Smith, of the home service department recently formed by the company.

SOLICIT GAS CONSUMERS IN JONESBORO, ARKANSAS

The New City Gas Company, of Jonesboro, Ark., which plans to begin laying mains soon after April 1, has representatives in the field soliciting gas consumers. This company has a 20-year franchise, recently granted by the city council.

BUYS JEFFERSON-TYRO LINE

The Jefferson-Tyro gas line which supplies gas to both Jefferson and Tyro in Kansas has been purchased by the Consolidated Oil and Gas Company. The purchase includes meters, power stations, etc. The Consolidated has more than 24,000 acres of leases near Wichita, Kansas.

Stockton
Fire Brick Company

FIRE BRICK, INSULATING BRICK
HIGH TEMPERATURE CEMENT

High Grade Refractories
for

GENERATOR LININGS
CHECKERS
BOILER SETTINGS

OFFICE:
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Stockton,
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HOT-N-KOLD

The Hot-N-Kold Shops are now serving the public in eight cities in the northern part of California with Kelvinator Refrigeration, Holbrook Ranges, Welsbauch Water Heaters, and other major appliances.

A valuable business franchise awaits the right dealer in every town.

HOT-N-KOLD CORPORATION

949 Mission Street San Francisco, California

PARKS GETS NATURAL GAS MANAGERSHIP FOR P. S. C. OF C.

T. F. Parks has been appointed manager of natural gas operations for the Public Service Company of Colorado, and will have charge of the Amarillo-to-Denver natural gas lines under V. L. Board, general superintenden of the Colorado utility. Mr. Parks is a graduate of the Kansas State Agricultural College, Manhattan, Kan., in engineering, and has been with the Doherty interests since 1916. He comes to Denver from Bartlesville, Okla., and his past service includes managership of eastern Kansas and Oklahoma properties in the Doherty system. He was at one time manager of the Joplin Gas Company, a Cities Service Company unit.

CARBON BLACK PLANT MAY BUILD IN SOUTHERN CALIFORNIA

According to report late in March, a company headed by Harry Bauer, former president of Pacific Gasoline Company before that organization was taken over by the Standard Oil Company of California, will build a carbon black plant, following experiments with a process patented by Dr. R. W. Poindexter, which have been under way at Signal Hill field, Southern California, on property of the Delano Land Company. No location has been announced as yet for the plant which may be erected. Operation of the one-ton experimental plant has been discontinued.

OKLAHOMA NATURAL ASSUMES CHARGE OF GAS COMPANIES

The Oklahoma Natural Gas Corporation on March 1 took charge of gas distribution properties in 14 Oklahoma towns. These are Oklahoma City, Shawnee, Enid, Yukon, Bethany, Britton, El Reno, Muskogee, Norman Ardmore, Healdton, Wilson, Ringling, and Oil City. The plants were recently purchased from the Oklahoma Gas and Electric Company. R. C. Sharp, of Tulsa, is president of the Oklahoma Natural Gas Corporation which is now one of the major gas production, transportation and distribution utilities in the United States.

PORTLAND BUDGET $750,000

Portland Gas and Coke Company during the present year will expend approximately $750,000 on improvements to its system, the budget providing for smoke eliminators ($90,000), for three new buildings for fire-fighting purposes at the gas plant, for construction of a dike around the gas plant oil tank, and for laying of approximately 60 miles of new mains estimated to cost $250,000.

LEIHY IN INDUSTRIAL SALES WORK FOR SO. COUNTIES

D. L. Leihy, formerly salesman with the Southern Counties Gas Company at San Pedro, Calif., is now assisting Charles L. Ferry, power engineer for the same company, on industrial engineering sales work, specializing on restaurant, hotel and light industrial equipment sales.

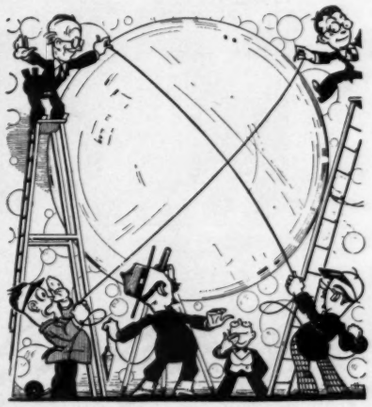
NO METER SHORT COURSE AT TEXAS AG. AND MECH. COLLEGE

According to F. C. Bolton, Dean of the School of Engineering, Agricultural and Mechanical College of Texas there will be no gas meter short course held at that institution this year, though there is a possibility such a course will be held next year.

ANTHONY PERMIT LET

City commissioners of Anthony, Kansas, granted a 20-year gas franchise to the Kansas-Oklahoma Utilities Company in March.

Billions of Bubbles



The Amazing Measurement of a Bubble!

Natural Gasoline Producers are agreed that the greater the intimacy between gas and absorption oil the greater the extraction.

So let's, for a moment, consider the computation of film area exposed in a Campbell Oil-Froth Absorber. It's really amazing.

It is estimated that the majority of Campbell bubbles composing the oil-froth are 1/32" in diameter. Assume, however, that they average as large as 1/16".

By simple computation then, there are, theoretically:

4,096 bubbles per cubic inch.
7,077,888 bubbles per cubic foot.
1,801,464,053 bubbles per absorber.
31,000,000,000,000 bubbles per day.

And each cubic foot of Oil-Froth exposes 603 square feet of oil film or 153,475 square feet per absorber.

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CAMEL-DAY GAS

We have other facts equally as revealing.

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Campbell Oil-Froth Absorbers

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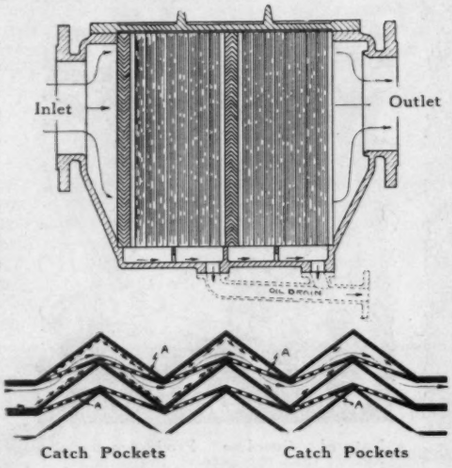
For removal of Oil Mist,exceptionally large adhesion surfaces are used. Baffles are placed at a scientifically correct angle and location for Minimum Back Pressure, and Maximum Adhesion, of Oil Mist. Centrifugal force, flings the slightly heavier particles of oil, clear of the gas stream, on to the Large Adhesion surfaces. Gas Stream passes over entire length of Adhesion surfaces, driving liquid into hundreds of catch pockets, where it is quickly removed to drains. Gas Steam is divided into a number of vertical streams, each stream being treated independent of adjacent streams. Inside Parts can be taken apart, cleaned and assembled again in a very short time.



Diagrammatic top view of Pioneer Separator showing principle. The thin, long arrows indicate the flow of the steam, air, gas, etc. The heavy short arrows show the flow of extracted impurities.

INSTALL PIONEER SEPARATORS BEHIND
ENGINES, COMPRESSORS, EVAPORATORS AND STILLS
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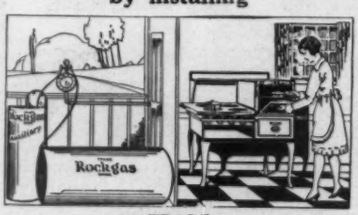
Pave the way for gas extension by installing



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in places where natural or artificial gas is not available

ROCKGAS will give temporary service in localities where gas mains are to be laid; also permanent service in the event that lines are not anticipated in the locality of installation. It is a form of pure natural gas and comes in convenient sized tanks of various sizes from a tank holding the equivalent of 3,000 cu. ft., 500 b.t.u. gas and 12x37 in. in size to tanks holding the equivalent of 44,040 cu. ft. of 500 b.t.u. gas, of much larger size. Used in thousands of homes, camps, etc.

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for Some Sections of California
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SOUTH CHESTER STEEL PIPE

Excels for Gas Service

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

SOUTH CHESTER TUBE CO.
Chester, Pa.

YOUNG P. C. G. A. ORATOR WINS MORE LAURELS

Pacific Coast Gas Association members will remember Ted Hatlan, 15-year-old representative of the Reliance Manufacturing Company in the three-minute speaking contest at last year's Santa Cruz convention. Young Hatlan, who came out victorious in one of the two P. C. G. A. contests, is "carrying on," having last month won the district championship in the "National Oratorical Contest on the Constitution" for high school orators. By right of his district victory Hatlan moved a step nearer to the Pacific Southwest championship, in which he is faced against orators from 29 California and Arizona high schools. The Pacific Southwest champion will enter the national finals at Washington, D. C., next May.

PROJECTED KANSAS LINE

A franchise to supply Great Bend, Kans., with gas is being sought by the Public Utility Investment Company of Salina. Under the proposed plan a pipe line would bring the gas from wells near Medicine Lodge, Kans., and would also connect with a line from the Texas Panhandle. A franchise is also being asked for in Hoisington through which the line from Medicine Lodge would extend. The line would also serve Pratt, St. Johns, and other towns.

LINE FROM SHALE FIELDS

The Mid-West Gas Company during the early part of March completed 17 miles of 8-inch and eight miles of 6-inch gas line, connecting the shale gas field north of Neodesha, Kans., with Chanute and Humboldt. Gas will be supplied to five towns along the line. The total cost of the line and a compressor station constructed five miles south of Humboldt, is approximately $150,000. A second compressor station is located two miles South of Altoona.

REPORT GAS DEVELOPMENTS FOR ARTESIA, N. M.

It is reported that Albert T. Woods and associates of San Antonio, Texas, have taken over the franchise for natural gas in the town of Artesia, New Mexico, from Messrs. Flynn, Welch and Yates. A line from the Artesia oil field, northeast of Artesia, is under way, and a survey of Artesia consumers is now being made, after which the city will be piped for gas.

MORAIRTY ADVANCED

A F. Morairty, former sales manager of the Central Arizona Light and Power Company, Phoenix, Ariz., has been named assistant manager of that utility to fill the vacancy made by the resignation of Wm. C. Hornberger, who has become vice-president and general manager of the Arizona Edison Company as previously announced in *Western Gas*. Mr. Morairty is a director of the Arizona Utilities Association.

CHARITON ADDITIONS

The Peoples Gas and Power Company is installing a new 30-foot gas scrubber of the dry bottom type and a moisture separator in Chariton, Iowa. It will be built of welded construction by the Semet-Solvay Engineering corporation, of New York. The new equipment also includes a quantity of Steere welded steel pipe and gate valves connecting relief holder, scrubbers, purifiers and meter.

FRANCHISE COMMITTEE NAMED FOR FOREST CITY, ARK.

A committee to work out terms and conditions of a gas franchise has been appointed by the city council of Forest City, Ark.

TOASTER CAMPAIGN

Although less than 200 gas toasters were disposed of by the Portland Gas and Coke Company sales force last year, a campaign is now on to sell 4,000 toasters in 1928. "One for 40c or two for 39c is the slogan by which the company confidently hopes to set up this unusual sales showing. The only publicity which the campaign had been accorded in March were two signs on the sales floor and a few envelope enclosures. A stop was put to the mailing of these enclosures because shipment of toasters could not be received fast enough to supply the demand.

GRACE JO MASON AT PUEBLO

Grace Jo Mason, formerly home service director for the Federal Light and Traction Company, is now home service director for the Pueblo Gas and Fuel Company, Pueblo, Colo. In her former association Miss Mason conducted home service work at utility properties in Springfield, Mo.; Tucson, Ariz.; Trinidad, Colo, and New Brunswick, Canada.

DOUBLE PLANT CAPACITY

Two units of 50,000-gallon capacity each, doubling the present capacity, are being added to the Shell Oil Company's gasoline recovery plant on the north slope of Signal Hill. Southwestern Engineering Corp. has the contract on the construction, with operation of a part of the plant expected to start by June 1st and work to be completed by July 1st. Considerable increase in gas output at Signal Hill has already been noted, with further large increases due to additional wells soon to come in expected.

FLOOD CAUSES SHUT-DOWN

A temporary shut-down of the Lovell Gasoline Company's plant, south of Santa Paula. Calif., was made necessary by the flood which followed the St. Francis dam break on March 13, carrying out lines of the Southern Counties Gas Company supplying the Lovell plant. Although the flood waters came very near the plant itself, it escaped without damage.

$200,000 PLANT AT TRACY

A $200,000 gas plant, construction on which was begun by the Tracy Gas Company on October 15, 1927, is now serving the community of Tracy, California. W. J. Rigney is president of the utility.

HELIUM IN GERMANY

Helium gas has recently been discovered in the vicinity of Frankfort-on-the-Main, Germany. This is claimed as the first helium gas discovery in Europe.

HENDRICK FIELD PLANT

The Hendrick oil field in the west Texas district is securing its first natural gasoline plant, to be erected by the Humble Oil and Refining Company.

NEW ROBINSON CATALOGUE

The Robinson Orifice Fitting Company has just issued a new catalog, No. 2, copies of which may be had by writing the company at 1435 Santa Fe Avenue, Los Angeles.

FIELDER GETS SALES OFFICE

T. E. Fielder has been appointed sales supervisor in the appliance sales department of the Oklahoma Gas & Electric Company, the appointment being effective March 1st.

Protection Plus

for your Pipelines

These are reasons why PIONEER RUBBERTEX is the perfect protection for your underground and exposed pipelines:—It is waterproof . . . immune to soil acids and alkalies . . . . it maintains its adhesive qualities . . . . does not disintegrate . . . incapable of absorption... unaffected by temperature changes . . . protects against electrolysis . . . practical for application in the field . . . . undamaged by ordinary handling . . . . substantial in thickness . . . economical.

Summed up briefly PIONEER RUBBERTEX means the most for your money . . . always!

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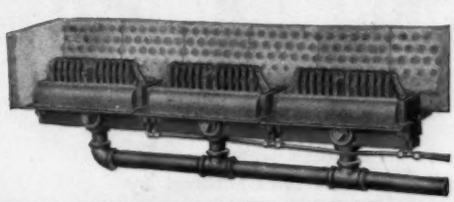
RUBBERTEX *and* PIPE COVERING

R. M. C. Gas Burner



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KEY *Special* PIPE JOINT COMPOUND

Water-Proof

KEY SPECIAL PIPE JOINT COMPOUND will effectively seal screw thread and gasket joints for such service as Gas, Water, Steam, Compressed Air, etc.

One of the many advantages this compound has over the commonly used red leads and oils, etc., is that the pigment w ll not settle to the bottom of the container, thereby holding the contents in equal suspension at all times ready for service.

KEY SPECIAL PIPE COMPOUND is not a quick hardening cement but a plastic lubricant and filler that will seal the most obst nate joint with ease.

You may test the high quality of this product by taking a small quantity between the fingers which will immediately demonstrate the wonderful lubricating qualities along with the "pull or drag" that makes possible a permanent seal without resorting to cementing materials, most of which are very undesirable and impracticable to use.

Write for **FREE** Sample

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"Steel Made" Radiators
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LINE FROM CHILLICOTHE TO STAMFORD, TEXAS

C. O. Moore and associates have let contracts for more than 200 miles of gas line to run from Chillicothe, Texas, to Stamford, Texas, and touching more than 30 west Texas towns. The line will handle gas from Texas Panhandle fields. The main line is to be eight-inch while the lateral lines will be four and six-inch. Construction work will start within a month or sooner.

SAND BLAST MACHINE NOW IN PORTLAND PLANT

Portland Gas and Coke Company has added a sand blast machine to its maintenance equipment at the Portland Gas Works, the apparatus being used to remove scale and rust from the inside of steel tanks and smoke scrubbers, preparatory to coating these with a metal layer.

BABCOCK AT SALES MEET

C. B. Babcock, president of the C. B. Babcock Company of San Francisco and Los Angeles, left the west coast on March 21 to attend the annual sales meeting of the General Gas Light Company at Kalamazoo, Michigan.

HENNESSEY ELECTION DUE

The board of trustees of Hennessey, Okla., has voted acceptance of the Gould and Black gas franchise proposal and an election has been set for April 10, at which voters will pass on the franchise proposition.

INDEPENDENCE PLANT WORKING

During March the Jackson County Light, Heat and Power Company began operation of its $300,000 plant from which gas will be served 4700 domestic consumers in Independence, Mo.

GAS APPLIANCE SALES STUDY

A special joint committee of the Gas Appliance Society of California has been meeting with groups representing range manufacturers, jobbers, and retailers, their efforts covering study of advertising, disposal of close-outs and other gas range merchandising problems.

ARAB GASOLINE CO. LINE

The Atex Construction Company just completing the laying of a 70-mile eight-inch oil line for the Atlantic Oil Producing Company from Wink, Texas, to Midland, Texas, are beginning the construction of a five-mile eight-inch gas line for the Arab Gasoline Company from its plant seven miles north of Eastland to the Good Oil field in the northwestern part of Eastland county, Texas.

PECOS PLANT EQUIPMENT

A quantity of Steere welded steel pipe will be installed in the plant of the Texas-Louisiana Power Company, of Pecos, Texas. The Semet-Solvay Engineering Corporation, of New York, has been given an order for exhust, muffler and intake pipe. Part of the material will be galvanized. Steere welded sleeve joints are specified.

SOUTHERN COUNTIES REVENUE

Southern Counties Gas Company, operating in Southern California, reports its 1927 operating revenue at $6,975,018.10, as compared with $5,981,404.79 for 1926.

MEASUREMENT STATIONS

The Southern Kansas Gas Company plans to erect two pressure reducing and gas measurement stations in Iola, Kansas, at a combined cost of $5,000.

CENTRAL GARAGE, WAREHOUSE FOR P. G. AND E.

The Pacific Gas and Electric Company's 1928 improvement program includes a provision for a combined central garage and warehouse, for which the block bounded by Eighteenth, Nineteenth, Shotwell and Folsom Streets has been purchased, for $250,000. Quarters large enough to take care of the expansion for several years ahead will be provided for the company's motor vehicle department.

LAWTON MEETING

Good Will conventions, held by the Public Relations Division of the Oklahoma Utilities Association are becoming increasingly popular. At Lawton, Okla., one such conference was held on February 23 with Keith Clevenger, chairman of the Public Relations Divisions, presiding. Sessions were held at the Chamber of Commerce, a good will banquet taking place in the evening at the First M. E. Church.

SLEEPY EYE GAS PROSPECT

Extension of gas service to the town of Sleepy Eye, Minn., is being considered by the Interstate Power Company, owner of the gas plant at New Ulm. From 300 to 400 customers would be necessary to make the project feasible, with the possibility that the village of Cobden would also be furnished with gas, as would farmers along the route of the pipe line which would be laid.

ARTESIA SERVICE DUE

Joe Burkett, secretary and general manager of hte Pecos Valley Gas Company, San Antonio, announces that within the next month gas will be flowing into the city mains of Artesia, New Mexixco. The work has already been started with the unloading of the first car of pipe, 11 more carloads being en route from Houston, Texas. Mr. Burkett is supervising the construction of this work.

PORT ALLEN PROPOSAL

Gas from northern Louisiana fields may be introduced into Port Allen if the Louisiana Natural Gas Company's application for franchise is granted. Gas charters have already been given the company in Westwego, Napoleonville and Plaquemine, according to reports.

NEVIN WANTS BUTTE PERMIT

Application for a 30-year franchise to operate a gas system in Butte, Mont., has been made by Charles P. Nevin, former mayor of Butte and president of the Nevin-Frank Manufacturing Company of the same community. Gas fields of Shelby and southeastern Montana were said to be under consideration as source of supply for the line contemplated by the new company to Butte.

NEAREST EL PASO SOURCE?

A gas strike has been made on the John Z. Means ranch in Jeff Davis County one and a half miles north of Chispa, Texas, according to report late in March. This is only 135 miles from El Paso, the closest gas to that community yet discovered. Whether or not the gas will be available in commercial quantities is not yet known.

TO VOTE ON GAS

A gas franchise ordinance for the service of either artificial or natural gas has been granted to M. J. White by the city council of Lees Summit, Mo., and special election has been called for April 3 to vote on the franchise.

Speed...Load Protection...Traction...Long Wear

If your trucks operate in swift transportation, Goodyear All-Weather Tread Pneumatics, with their heavy tread and sturdy sidewall ribs, are specially designed to face this gruelling work.

For high-speed, long distance trucks operating over smooth pavements, where traction is not as essential as long, smooth, even tread wear, Goodyear Grooved All-Weather Tread Pneumatics are ideal.

We recommend Goodyear Truck Pneumatics because we KNOW what they can do for you. And the service that we put back of them here at Truck Tire Service will add materially to the mileage and satisfaction that you may expect to receive.

We are equipped to render COMPLETE REPAIR SERVICE on pneumatic truck tires

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LININGS, CHECKERS and BOILER SETTINGS are carried in stock for quick shipment. If special or hand-made shapes are required, our plant is especially equipped to make them.
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FERROX

Purifier

meets these essential requirements of a good Gas Purifier

A highly active Iron precipitate, with a high Iron content. A thoroughly impregnated and porous bulky mass, ready to use, no delay, always uniform.

A dependable source of supply

Pioneer manufacturers of Industrial Chemicals on the Pacific Coast

Stauffer Chemical Company

624-638 California Street, San Francisco, California

300-MILE LINE SURVEY

A survey is being made by the Magnolia Gas Company for a 300-mile gas line from the Wheeler county field in the Texas Panhandle, to Fort Worth. The line will probably run via Chicasha and other Oklahoma and Texas towns, according to the Oklahoma Utilities Association.

WILLIAMS IN WEST

B. B. Williams, president of C. & G. Cooper Company of Mt. Vernon, Ohio, spent last month on the Pacific Coast with J. W. Reed, Pacific Coast manager for the company.

APPLIANCE SALES IN NATCHEZ

The Central Power and Light Company during the year 1927 sold a total of $32,730.28 worth of merchandise in Natchez, Miss., which total included 453 gas space heaters, 121 gas ranges, 61 gas tank heaters, 26 gas hot plates.

GAS CONVENIENCE IN DES MOINES AUTO PARKS

In several auto parks of Des Moines, Iowa, there have recently been erected log cabins equipped with gas stoves and fireplace heaters, so that visitors may enjoy the convenience of gas-cooked food and gas heat.

ACCIDENTS DECREASE

As a result of organized safety work introduced at the beginning of 1927 by the Los Angeles Gas and Electric Corporation a 32 per cent decrease has been noted in lost-time accidents, while days lost from such accidents decreased approximately 50 per cent. Accident work for the corporation is in charge of J. R. Rowe, safety engineer.

GULF PRODUCTION CO. MAY ERECT PANHANDLE PLANTS

It is rumored that the Gulf Production company's recent purchase of gas acreage in the White Deer area in Carson county, Texas, is the first move leading to the building of plants in the Texas Panhandle. This company has been checking gasoline and carbon black plants in that area for some time.

INDUSTRIAL SURVEY

The Southwest Gas Company is conducting an industrial survey in towns that lie along the route of the proposed gas line from Cuero, Texas to Karnes City, Texas. The other towns being surveyed are Kenedy, Runge, Yorktown and Nordheim.

ST. JOSEPH LINE

Cities Service Gas Company is to construct a pipe line from Leavenworth, Kansas, to St. Joseph, Missouri, at a cost of approximately $1,000,000. The line will cross the Missouri River at Leavenworth and will be carried on the government bridge.

MOVE L. A. OFFICE

S. F. Godfrey, Pacific Coast manager for the Brown Instrument Company of Philadelphia, announces the removal of the company's Los Angeles office to 420 San Pedro Street, effective April 1st.

MUSCATINE, IOWA, CHARTERS GAS UTILITY

Late in February a gas franchise in Muscatine, Iowa, was given the Iowa Electric Company of Cedar Rapids, Iowa, by the city council of Muscatine, following favorable vote of citizens on the matter.

MILHAM GETS FOURTH GASSER IN GOOSE LAKE AREA

The Milham Exploration Company late in March announced the bringing in of its fourth gas well in the Goose Lake area near Buttonwillow, Calif., where a dry gas area is being tested.

SLATON OFFICE

The West Texas Gas Company has recently completed a $7,000 structure which will house its offices at Slaton, Texas, in Lubbock County. E. B. Carroll is the gas company's manager at Slaton.

UTILITY INTERESTS SOLD

The Charles Page Gas Utilities of Wichita, Kansas, have been sold to the Oklanahhma Power & Water Company for the consideration of $8,000,000.

SAFETY CONGRESS

An attendance of approximately 2,000 persons is anticipated for the Second Annual Central States Safety Congress, to be held in Kansas City from April 23 to 25.

ENGLEBRIGHT ADVANCED

A. E. Englebright, formerly assistant superintendent of the gas department for the Pacific Gas and Electric Company at San Rafael, Calif., is now gas superintendent in the company's North Bay Division.

THREE CARBON BLACK PLANTS

Three more carbon black plants are to be built in the Texas Panhandle by the Phillips Petroleum Company. One will be in Gray county near the Bowers pool, one near the Wester and Cosmos plants in Carson county, and one in Hutchinson county.

SAN ANTONIO EXTENSION

W. D. Burk, superintendent, for the San Antonia Public Service Company, announces that the gas department is now working with forced draft on four new gas line extensions, to the Greenlawn Estates, Harding Boulevard, Olmos Park Addition and Hot Wells sections of San Antonio, Texas.

RATES DROP

Reduction in domestic gas rates to the extent of three cents per M.c.f. has been volunteered in Oklahoma City by the Oklahoma Natural Gas Corporation, bringing the rate now to 57c a thousand. The 20c rate on industrial gas in excess of 10,000 cu. ft. per day was reduced to 18c

ASKS LITTLE ROCK CHARTER

W. I. Shuman of Miami, Florida has made application to the city council of Little Rock, Ark., for a franchise to supply that city with gas which he proposes to bring from the Louisiana fields. Indications are that the proposed line would pass near Pine Bluff and have as its terminus, Memphis, Tenn. The application requests a thirty-year franchise.

ON MEXICO TRIP

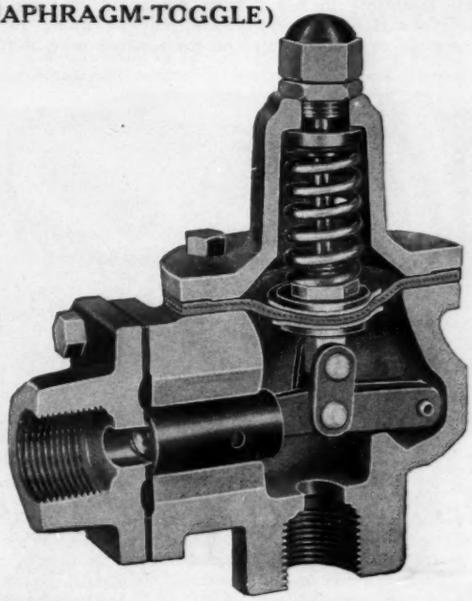
G. H. Unkefer, manager of the Los Angeles office of Westcott & Greis left Los Angeles the middle of March for a trip to Mexico City in the interests of his company.

HUMPHREY ON COAST

Hubert R. Humphrey of the General Gas Light Company, Kalamazoo, Michigan, spent the past month on the Pacific Coast with C. B. Babcock, the company's Pacific Coast manager.

The New Diatog Relief Valve

(DIAPHRAGM-TOGGLE)



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Protect your high pressure equipment.
These valves guaranteed to operate without leak. Your money refunded if not satisfactory. Price—¾ in., $4.50; 1 in., $5.00.
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408 Tulsa Trust Bldg., Tulsa, Okla.
Wescott & Greis, Inc.
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705 Public Service Bldg., Portland, Oregon

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A WESTERN GUIDE to INDUSTRIAL PURCHASING

Readers interested in any articles not listed in these pages are cordially invited to advise *Western Gas* of their wants and every effort will be made to furnish a list of the proper manufacturers. Addresses of companies listed on these pages may be found by consulting their advertisements in this issue.

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Baker Iron Works.
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Chaplin-Fulton Mfg. Co.
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Lattimer-Stevens Co.
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The Bartlett Hayward Co.
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Fort Worth Laboratories.
A. R. Maas, Laboratories.
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The Bartlett Hayward Co.
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Blocks and Tiles, Fire Clay
Gladding, McBean & Co.
Semet-Solvay Engr. Corpn.
Stockton Fire Brick Co.

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Ingersoll-Rand Co.
Connersville Blower Co.

Boiler—Brickwork
J. T. Thorpe & Son, Inc.

Boiler Equipment
E. A. Key Co.

Boiler Maker's Tools
E. A. Key Co.

Boilers, Gas-Fired
C. B. Babcock Co.
Baker Iron Works.

Boiler Settings, Pipe and Boiler Insulation
Pioneer Paper Company.
J. T. Thorpe & Son, Inc.

Boilers, Waste Heat
Baker Iron Works.
The Bartlett Hayward Co.

Boilers, Water Tube
Baker Iron Works.
Western Pipe & Steel Co.

Boxes
Baker Iron Works.
Semet-Solvay Engr. Corpn.

Brass (rods, sheets, tubes, wire)
Mueller Co.

Breakers
Ingersoll-Rand Co.

Breeching (Boiler and Stack)
The Bartlett Hayward Co.
Western Pipe & Steel Co.

Brick, Firebrick
Gladding, McBean & Co.
Semet-Solvay Engr. Corpn.
Stockton Fire Brick Co.

Brick, Firebrick—Installation
J. T. Thorpe & Son, Inc.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Buildings, Steel
Baker Iron Works.
Western Pipe & Steel Co.

Bunkers, Steel and Concrete
The Bartlett Hayward Co.
Western Pipe & Steel Co.

Burners, High Pressure
Lee B. Mettler.
Rotary Manufacturing Co.

Burners, Low Pressure
C. B. Babcock Co.
The Bartlett Hayward Co.
General Gas Light Co.
Johnson Gas Appliance Co.
Lee B. Mettler.
Payne Furnace & Supply Co.
Rotary Manufacturing Co.
Standard Gas Equipment Corp.

Burners—Oil
Rotary Manufacturing Co.

By-product Recovery Apparatus
The Bartlett Hayward Co.
Oliver Continuous Filter Co.
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Calorimeter Accessories
Fort Worth Laboratories.
Pacific Meter Works.

Calorimeters
Pacific Meter Works.

Cases, Meter
Pacific Meter Works.
Pittsburgh Equitable Meter Co

Casinghead, Gas Meters
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.

Casing and Tubing (steel)
Semet-Solvay Engr. Corpn.
South Chester Tube Co.

Casing—Iron
South Chester Tube Company

Cast Iron Pipe
McWane Cast Iron Pipe Co.
Semet-Solvey Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

Castings
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

Cement
Stockton Fire Brick Co.

Cement, High Temperature
Stockton Fire Brick Co.

Cement—Plastic
Pioneer Paper Company.

Centrifugal Pipe
United States Cast Iron Pipe and Foundry Co.

Charging Machines (retort, etc.)
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

Checker Brick
Gladding, McBean & Co.
Semet-Solvay Engr. Corpn.
Stockton Fire Brick Co.

Chemical and Gas Testing Apparatus
Fort Worth Laboratories.
Pacific Meter Works.
Stauffer Chemical Co.
Westcott & Greis, Inc.

Chemists, Analytical
Fort Worth Laboratories.
A. R. Maas, Laboratories.
Smith-Emery Co.

Chimneys, Radial Brick
Gladding, McBean & Co.
Stockton Fire Brick Co.

Chimneys, Radial Brick Installation
J. T. Thorpe & Son, Inc.

Chutes (coal, coke, ash)
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

Clamps and Sleeves, Pipe
S. R. Dresser Mfg. Co.
Mueller Co.

Clamps, Service
Mueller Co.

Cleaners, Service
C. B. Babcock Co.
Pacific Meter Works.

Coal Gas Plants
Charles R. Collins.
Semet-Solvay Engr. Corpn.
The Bartlett Hayward Co.

Coal Tar Products and Chemicals
W. P. Fuller & Co.
A. R. Maas, Laboratories.

Cocks
C. B. Babcock Co.
Johnson Gas Appliance Co.
Lattimer-Stevens Co.
Merco Nordstrom Valve Co.
Mueller Co.
Geo. D. Roper Corporation.

Collectors, Dust
Western Pipe & Steel Co.
Semet-Solvay Engr. Corpn.

Compressors, Air
The C. & G. Cooper Co.
Ingersoll-Rand Co.
Oliver Continuous Filter Co.

Compressors, Gas
The C. & G. Cooper Co.
Ingersoll-Rand Co.

Compressors, High Pressure
The C. & G. Cooper Co.
Ingersoll-Rand Co.

Compressors, Portable
Ingersoll-Rand Co.

Condensers
Baker Iron Works.
The Bartlett Hayward Co.
Ingersoll-Rand Co.
Semet-Solvay Engr. Corpn.

Condenser Boxes
Baker Iron Works.

Condenser Tubes
Semet-Solvay Engr. Corpn.

Controllers
Fort Worth Laboratories.
Jensen Instrument Co.
The Foxboro Co., Inc.

Controls, Air and Steam
Jensen Instrument Co.
The Bartlett Hayward Co.
C. F. Braun & Co.
The Foxboro Co., Inc.

Cooling Systems
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

Cooling Towers
J. A. Campbell
Fluor Construction Co.
J. B. Gill Corporation.
Jackson Engr. & Equip. Co.
Semet-Solvay Engr. Corpn.

Counters, Revolution
Fort Worth Laboratories.
Jensen Instrument Co.

Couplings
S. R. Dresser Mfg. Co.
The Bartlett Hayward Co.

Coverings (Tank, Boiler, Cold and Steam Pipe)
Pioneer Paper Company.

Cubic Foot Bottle
Pacific Meter Works.

Cutters, Pavement
Ingersoll-Rand Co.

Cutters, Pavement
Ingersoll-Rand Co.

Cylinders, Compressor
The C. & G. Cooper Co.
Semet-Solvay Engr. Corpn.

Dephlegmaters
J. A. Campbell
Semet-Solvey Engr. Corpn.
Western Pipe & Steel Co.

Diaphragms, Meter
Chaplin-Fulton Mfg. Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co

Diggers, Clay
Ingersoll-Rand Co.

Discharging Machines (retort, etc.)
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

Displacement System, Tar
Semet-Solvey Engr. Corpn.

Door, Clean-out
Baker Iron Works.
Semet-Solvay Engr. Corpn.

Drills
Ingersoll-Rand Co.
Mueller Co.

Drill Pipe—Iron
South Chester Tube Company

Drill Pipe—Steel
South Chester Tube Company

Dryers—Domestic Laundry, Commercial Laundry, Laboratory, Industrial.
The W. E. Lamneck Co.

Dryers—Blue Prints, Photograph film, etc.
The W. E. Lamneck Co.

Dryers—Dehydrating Fruits,
The W. E. Lamneck Co.

Elevators
Baker Iron Works.

Engineers and Engineering Service
J. A. Campbell
Charles R. Collins.
J. B. Gill Corporation.
The Bartlett Hayward Co.
A. R. Maas, Laboratories.
Smith-Emery Co.
Southwestern Engineering Corp.
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

Engines, Diesel
The C. & G. Cooper Co.

Engines, Gas
The C. & G. Cooper Co.
Ingersoll-Rand Co.

Engines, Oil
The C. & G. Cooper Co.
Ingersoll-Rand Co.

Engines, Steam
Ingersoll-Rand Co.

Evaporating Apparatus
The Bartlett Hayward Co.
C. F. Braun & Co.
United States Cast Iron Pipe and Foundry Co
Southwestern Engineering Corp.

Excavators, Ditch and Trench
The Cleveland Trencher Co.

Exchangers, Heat
Baker Iron Works.
C. F. Braun & Co.
J. A. Campbell
Southwestern Engineering Corp.
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

Exhausters
Connersville Blower Co.
Ingersoll-Rand Co.
United States Cast Iron Pipe and Foundry Co.

Experimental Apparatus
The Bartlett Hayward Co.
Pacific Meter Works.

Extractors
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

Faucets, Drain
Mueller Co.

Felt—Deadening
Pioneer Paper Company.

Filters
Oliver Continuous Filter Co.
United States Cast Iron Pipe and Foundry Co.

Fire Clay and Products
Gladding, McBean & Co.
Stockton Fire Brick Co.

Fire Brick Contractors
J. T. Thorpe & Son, Inc.
Stockton Fire Brick Co.

Fittings
The Bartlett Hayward Co.
McWane Cast Iron Pipe Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

Fixtures, Lighting (Domes, Portables, etc.)
C. B. Babcock Co.
Welsbach Company.

Feed Water Heaters
C. F. Braun & Co.
Southwestern Engineering Corp.

Fire Brick
Gladding, McBean & Co.
Stockton Fire Brick Co.
Semet-Solvay Engr. Corpn.

Flanges
Pittsburgh Equitable Meter Co
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

Flooring—Industrial
Pioneer Paper Company.

Forgings
Baker Iron Works.
Payne Furnace & Supply Co.
Pacific Gas Heating Co.
Geo. D. Roper Corporation.
J. T. Thorpe & Son, Inc.

Furnaces, Floor
Magic Way Company
Payne Furnace & Supply Co.
Pacific Gas Heating Co.

Furnaces, Heating
Payne Furnace & Supply Co.
Pacific Gas Heating Co.
Magic Way Company.

Furnaces, Lead Melting
C. B. Babcock Co.
The Estate Stove Co.
Johnson Gas Appliance Co.
Mueller Co.
Payne Furnace & Supply Co.

Gas Analysis Apparatus
The Foxboro Co., Inc.
Fort Worth Laboratories.
Jensen Instrument Co.
Pacific Meter Works.

Gas Masks
Safety Gas Main Stopper Co.

Gas Main Tapping & Drilling Machines
Mueller Co.

Gaskets
The E. A. Key Company
Pittsburgh Equitable Meter Co
Safety Gas Main Stopper Co.
Semet-Solvay Engr. Corpn.
Southwestern Pipe Joint and Engineering Co.

Gasket Compound
W. P. Fuller & Co.
E. A. Key Co.

Gasometer
Pacific Meter Works.
Semet-Solvay Engr. Corpn.

Gas Pipe Line Construction
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

Gauges
Fort Worth Laboratories.
The Foxboro Co., Inc.
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

Gauges, Steam
Jensen Instrument Co.
Semet-Solvay Engr. Corpn.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Gauges, U Type
C. B. Babcock Co.
Fort Worth Laboratories.
Jensen Instrument Co.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge.

Situations Wanted

Note: *Western Gas* will publish free of charge, under this heading, advertisements of situations wanted. Maximum length, 50 words; additional space at classified rates five cents per word per insertion. Copy should be neatly typewritten on one side of paper only, and should be mailed to reach *Western Gas* not later than the 20th day of the month prior to publication date.

Distribution Superintendent with small or medium sized company. Thirty-three years old. Fourteen years' experience with manufactured and natural gas. Last employed as District Manager. Best of references. A-12, care of *Western Gas,* 124 West Fourth St., Los Angeles.

Woman applicant with over nine years' secretarial and stenographic experience desires similar work in southern California. Satisfactory references from utility field can be furnished. Available for position after March 1. Address A-13, care of *Western Gas,* 124 West Fourth St., Los Angeles.

Gas Engineer, 14 years experience, college graduate. Has own bookkeeper, 10 years experience in the gas business, making all state reports. Also has two helpers who know the gas business. Best of references. Address T. Wood, Cement, Oklahoma—or Western Gas, A-14, at 124 West Fourth St., Los Angeles.

P. G. AND E. WILL SUPPLY GAS TO ALAMEDA COUNTY TOWNS

The California Railroad Commission has granted a certificate of convenience and necessity to the Pacific Gas and Electric Company to operate a gas distributing system in the communities of Irvington, Mt. Eden, Mission San Jose, Warm Springs, and contiguous territory in Alameda County, denying the application of the Alameda County Gas Company for a similar certificate. The P. G. and E. proposes to charge a rate of $1.22 per M. c. f.

WILLIAMS TO WICHITA

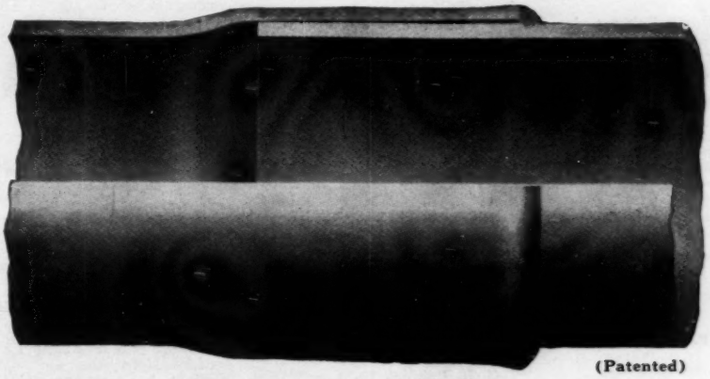
L. D. Williams, associated with the Natural Gas Division of the Empire Companies at Bartlesville, Okla., has been transferred to Wichita, Kan. Mr. Williams in his capacity of gas engineer for the company's Transportation Department represented the gas division during the construction of the 20-inch line from Pampa, Tex. to Wichita, Kan., and his new duties will relate to this line and to territory adjacent to Wichita.

ALLEN CHARTER ASKED

The Southwest Gas Company has applied to the city council of Allen, Okla., for a gas franchise.

THE FACTS

ABOUT "ASTCO" SEAMLESS STEEL SLIP-JOINT LINE PIPE



(Patented)

JUST in case you want to have data on hand (a good idea—saves waiting for a catalog in the mail!) we're giving you here some of the essential facts about the superiority of "ASTCO" Seamless Steel Slip-Joint Line Pipe. We suggest that you have them copied, and file them for ready reference. Here they are:

ASTCO Seamless Steel Slip-Joint Line Pipe is fabricated from Siemens-Martin high-carbon steel by the Mannesmann-Pilger process. It has a high tensile strength—about 85,000 pounds to the square inch, with 20% elongation in two inches. Ordinary lapwelded steel tubes have an average tensile strength of around 57,000 pounds, with 25% elongation.

Actual tests show that ASTCO Slip-Joint Line Pipe can be used even for *working pressures* over 1,000 pounds per square inch, with a safety factor of from 2.5 to 4.0. All ASTCO slip joint used in these tests withstood pressures of at least 2,845 pounds per square inch. In the same tests only two tubes became leaky at the weld at pressures of 4,125 and 3,129 pounds per square inch respectively. The welds, incidentally, were made by a workman of but *average* skill.

ASTCO Seamless Steel Slip-Joint Line Pipe is available in long random lengths up to 45 feet, and in all diameters. The patented ASTCO tapered slip-joint insures a tight connection. The slip-joint can be supplied with holes for spot-welding if desired.

These are the essential facts about ASTCO Slip-Joint Line Pipe. Keep them handy, so you can consult them quickly and easily. And we'll send you the complete bulletin on ASTCO Slip-Joint Line Pipe, too, if you'll write us.

AMERICAN SEAMLESS TUBE CORPORATION OF CALIFORNIA

Petroleum Securities Building. Los Angeles, California

535 5th. Ave. New York City

STRENGTH RESISTANCE ASTCO DURABILITY

Trade Mark Reg.

1211 Neils Esperson Bldg. Houston, Texas

Fire Brick Contractors

Established 1906

J. T. Thorpe & Son

Inc.

Specializing in Gas Generator, Boiler, Still and Furnace Brick, Industrial Furnaces, Retorts, Kilns, Brick Smokestacks.

A capable Engineering Department competent to advise on any problem involving firebrick construction.

San Francisco 417 Market St. | **Seattle** 939 Stewart Bldg. | **Portland** 609 Ry. Exch. Bldg. | **Los Angeles** 321 W. 3d St.

Lee B. Mettler.
Pacific Meter Works.
Safety Gas Main Stopper Co.
Semet-Solvay Engr. Corpn.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Generators, Water Gas
The Bartlett Hayward Co.
Baker Iron Works.
Semet-Solvay Engr. Corpn.

Glassware
Fort Worth Laboratories.
Westcott & Gries, Inc.

Governors
C. B. Babcock Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Pacific Meter Works.
Reynolds Gas Regulator Co.
Sprague Meter Co.
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

Hammers
Ingersoll-Rand Co.

Hanger, Meter
Mueller Co.

Hangers, Iron and Steel
Baker Iron Works.

Heaters
C. B. Babcock Co.
Baker Iron Works.
C. F. Braun & Co.
The Estate Stove Co.
General Gas Light Co.
Magic Way Company.
New Way Mfg. Co.
Pacific Gas Heating Co.
Payne Furnace & Supply Co.
Welsbach Company.

Heaters, Floor
General Gas Light Co.
Magic Way Company.
Payne Furnace & Supply Co.

Heaters, Wall
C. B. Babcock Co.
General Gas Light Co.
Magic Way Company.
Payne Furnace & Supply Co.

Heat Exchangers
Baker Iron Works.
C. F. Braun & Co.
Southwestern Engineering Corp.
Semet-Solvey Engr. Corpn.
Western Pipe & Steel Co.

Heat Interchangers
C. F. Braun & Co.
Southwestern Engineering Corp.
J. A. Campbell
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

Hoists
Ingersoll-Rand Co.

Holders
The Bartlett Hayward Co.
Baker Iron Works.

Holders, High Pressure
Baker Iron Works.
Western Pipe & Steel Co.

Hoppers
The Bartlett Hayward Co.

Hose, Air
Ingersoll-Rand Co.

Hot Plates
C. B. Babcock Co.
Johnson Gas Appliance Co.
Geo. D. Roper Corporation.

Hygrometers
Fort Worth Laboratories.
Jensen Instrument Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Incinerators
C. B. Babcock Co.
Baker Iron Works.
J. T. Thorpe & Son, Inc.
Western Pipe & Steel Co.

Incinerator Brickwork
J. T. Thorpe & Son, Inc.

Indicators
Westcott & Greis, Inc.

Instruments (Measuring, Testing and Recording)
Fort Worth Laboratories.
Jensen Instrument Co.
Pacific Meter Works.
The Foxboro Co., Inc.
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

Insulating Materials
W. P. Fuller & Co.
Pioneer Paper Company.
Stockton Fire Brick Co.

Joint Runners Asbestos
Safety Gas Main Stopper Co.

Kilns
J. T. Thorpe & Son, Inc.
Western Pipe & Steel Co.

Kilns—Brickwork
The Bartlett Hayward Co.

Laboratory Supplies
Fort Worth Laboratories.
Mueller Co.
Westcott & Greis, Inc.

Ladles, Hot Metal
Mueller Co.

Lamps
C. B. Babcock Co.
General Gas Light Co.
Welsbach Company.

Lighters
C. B. Babcock Co.
Tappan Stove Co.

Lighting Incidentals
C. B. Babcock Co.
Welsbach Company.

Line Pipe—Iron
South Chester Tube Company

Line Pipe—Steel
Amer. Seamless Tube Corp.
South Chester Tube Company

Linings—Brickwork
J. T. Thorpe & Son, Inc.

Linings—Car
Pioneer Paper Company.

Main, Bags
C. B. Babcock Co.
Mueller Co.
Safety Gas Main Stopper Co.

Mains, Street
United States Cast Iron Pipe and Foundry Co.

Main, Stopper
C. B. Babcock Co.
Mueller Co.
Safety Gas Main Stopper Co.

Mantles, Gas Lighting
C. B. Babcock Co.
General Gas Light Co.
Welsbach Company.

Manometers
J. A. Campbell
Fort Worth Laboratories.
Jensen Instrument Co.
Lee B. Mettler.
Westcott & Greis, Inc.

Meters, Air
Connersville Blower Co.
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Meters, Boiler
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.

Meters, Burner Test
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Cast Iron Gas
The Bartlett Hayward Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meter Connections
Lattimer-Stevens Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Complaint
Pittsburgh Equitable Meter Co

Meters, Consumers
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Flow
The Foxboro Co., Inc.
Jensen Instrument Co.
Pittsburgh Equitable Meter Co
Westcott & Greis, Inc.

Meters, Fluid
Jensen Instrument Co
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Meters, Gas
Connersville Blower Co
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.
Westcott & Greis, Inc.

Meters, Gasoline and Oil
Jensen Instrument Co.
Pittsburgh Equitable Meter Co
Westcott & Greis, Inc.

Meters, High Pressure Distribution
Fort Worth Laboratories.
Jensen Instrument Co.
Pittsburgh Equitable Meter Co
Pacific Meter Works.
Sprague Meter Co.
The Foxboro Co., Inc.

Meters, High Pressure Iron Case
The E. A. Key Company
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Industrial Consumers
Connersville Blower Co.
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.
The Foxboro Co., Inc.

Meters, Iron Case
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Laboratory
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.
Westcott & Greis, Inc.

Meters, Large Capacity
Connersville Blower Co.
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.
Westcott & Greis, Inc.

Meters, Oil
Connersville Blower Co.
Jensen Instrument Co.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Meters, Orifice
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Robinson Orifice Fitting Co.
Westcott & Greis, Inc.

Meters, Oxygen
Fort Worth Laboratories.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Oxygen and Hydrogen
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meters, Prepayment
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

Meter Seals
Lattimer-Stevens Co.

Meter Shelves
Lattimer-Stevens Co.

Meter Swivels and Caps
Lattimer-Stevens Co.

Meters, Station
Connersville Blower Co.
The Bartlett Hayward Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co

Meters, Steam
Jensen Instrument Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Meters, Test
Fort Worth Laboratories
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.
Westcott & Greis, Inc.

Meters, Water
Jensen Instrument Co.
Pittsburgh Equitable Meter Co
Westcott & Greis, Inc.

Meters, Wet Test
Pacific Meter Works.
Pittsburgh Equitable Meter Co

Mixers, Gas and Air
C. B. Babcock Co.
Geo. D. Roper Corporation.

Oil Condenser Sections
Semet-Solvay Engr. Corpn.

Oil, Diaphragm
Pacific Meter Works.

Over Heat Control
The Wilcolator Company

Oxide
C. B. Babcock Co.
A. R. Maas, Laboratories.
Stauffer Chemical Co.

Packing, Asbestos
Safety Gas Main Stopper Co.

Paint
The Arco Company.
Everlasting Paint & Sales Co.
W. P. Fuller & Co.
Pioneer Paper Company.
Hill, Hubbell & Company.

Photometers
Pacific Meter Works.

Pilots
Payne Furnace & Supply Co.
The Wilcolator Company

Pipe
Amer. Seamless Tube Corp.
McWane Cast Iron Pipe Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.
Western Pipe & Steel Co.

Pipe Compound
E. A. Key Co.

Pipe, Copper
Mueller Co.

Pipe Covering
Hill, Hubbell & Company.
Pioneer Paper Company.

Pipe Couplings
S. R. Dresser Mfg. Co.

Pipe Cutters
W. W. Strickler & Bros.

Pipe—Iron
South Chester Tube Company

Pipe—Steel
Amer. Seamless Tube Corp.
South Chester Tube Company

Pipe Coils, Bends, Van Stone Joints, Gasketless Flange Joints, Welded Nozzle Headers
Semet-Solvay Engr. Corpn.
Southwestern Pipe Joint and Engineering Co.

Pipe Jointers
Mueller Co.

Plugs (testing mains and running service)
C. B. Babcock Co.
Jensen Instrument Co.
The Foxboro Co., Inc.
Safety Gas Main Stopper Co.
United States Cast Iron Pipe and Foundry Co.

Pre-Heaters
Baker Iron Works.
C. F. Braun & Co.
J. A. Campbell
Southwestern Engineering Corp.
Western Pipe & Steel Co.

Producers, Gas
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

Provers, Meter
Pacific Meter Works.
Pittsburgh Equitable Meter Co

Pumps
C. B. Babcock Co.
Connersville Blower Co.
Ingersoll-Rand Co.
Mueller Co.
Oliver Continuous Filter Co.
Pacific Meter Works.
Geo. D. Roper Corporation.
Safety Gas Main Stopper Co.

Purifiers
Baker Iron Works.
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

Purifying Materials
C. B. Babcock Co.
Connelly Iron Sponge & Governor Co.
A. R. Maas, Laboratories.
Stauffer Chemical Co.

Purifiers, Oil Absorption
Western Pipe & Steel Co.

Pyrometers (Indicating and Recording)
Fort Worth Laboratories
Jensen Instrument Co.
Westcott & Greis, Inc.

Radiants
C. B. Babcock Co.
General Gas Light Co.

Radiant Heaters
C. B. Babcock Co.
General Gas Light Co.
Welsbach Company.

Radiators—Gas Fired
Magic Way Company.

Ranges
C. B. Babcock Co.
Detroit Vapor Stove Co.
The Estate Stove Co.
Geo. D. Roper Corporation.
Standard Gas Equipment Corp.
Tappan Stove Co.

Ranges, Closed Top
C. B. Babcock Co.
Geo. D. Roper Corp.
Standard Gas Equipment Corp.
Tappan Stove Co.

Receivers, Air
Ingersoll-Rand Co.
Western Pipe & Steel Co.

Recorders
Fort Worth Laboratories.
Jensen Instrument Co.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Refrigerating Machinery
C. & G. Cooper Co.
Ingersoll-Rand Co.

Refractory Materials
Gladding, McBean & Co.
Stockton Fire Brick Co.

Regulators, Heat
C. B. Babcock Co.
Magic Way Company.
Payne Furnace & Supply Co.
The Foxboro Co., Inc.
The Wilcolator Company

Regulators, High Pressure
C. B. Babcock Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Fort Worth Laboratories.
Mueller Co.
Reliance Mfg. Co.
Reynolds Gas Regulator Co.
Sprague Meter Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Regulators, Hot Water Heat Control
Mueller Co.

Regulators, Low Pressure
C. B. Babcock Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Fort Worth Laboratories.
Reliance Mfg. Co.
Mueller Co.
Reynolds Gas Regulator Co.
Sprague Meter Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

Regulators, Temperature
C. B. Babcock Co.
Fort Worth Laboratories
Jensen Instrument Co.
Magic Way Company.
Payne Furnace & Supply Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.
The Wilcolator Company

Regulators, Oven
C. B. Babcock Co.
Connelly Iron Sponge & Governor Co.

Repairs—Brickwork
J. T. Thorpe & Son, Inc.

Retorts
The Bartlett Hayward Co.

Riveted Pipe
The Bartlett Hayward Co.

Rock Gas
Imperial Gas Co.

Roofing
The C. & G. Cooper Co.
Pioneer Paper Company.

Rotisserie
C. B. Babcock Co.
General Gas Light Co.

Rust Preventatives
Pioneer Paper Company.

Seals
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TO OPERATE IN KANSAS COUNTIES

Privilege to engage as a natural gas utility in Montgomery, Labette and Bourbon counties was granted the Southwestern Gas Company of Independence, Kansas, on March 12, and an issue of 2,000 shares of no par common stock, for $183,307, was authorized.

GASOLINE PLANT

The Texas Company is building a gasoline plant in the northwest quarter of section 2, block 1, ACH&B survey, in the Texas Panhandle.

MEMPHIS LINE SEEN IN NEW ARKANSAS DEVELOPMENT

The Arkansas Natural Gas Company has applied to the city council of Forest City, Arkansas, for a franchise to supply that city with natural gas. This is interpreted by some to indicate that the Cities Service Company and other interests who will merge with the Arkansas Natural Gas Company plan to extend the company's line from Little Rock, Arkansas, to Memphis, Tenn. Forest City is half way between Little Rock and Memphis.

WOULD SERVE NATURAL GAS IN MANHATTAN, KANSAS.

The United Power and Light Corporation is seeking a natural gas franchise in Manhattan, Kans. This company own producing wells in the McPherson fields and proposes to bring the gas into Manhattan through an extension to the line underway to Hutchinson from that field. The United company is at present supplying gas to Manhattan through the artificial gas plant which it maintains.

COMPLETE 50-MILE LINE TO AUSTIN, TEXAS

A 12-inch line, 50 miles in length has recently been completed by the Southern Gas Utilities, Inc., from the company's line at New Braunfels to Austin, Texas. This company owns the distributing system at New Braunfels and Seguin and is soon to begin construction on a system in San Marcos. The distributing system at Austin is owned by S. G. Ohrstrom & Company of New York.

MOUNTAIN STATES GASOLINE NEEDS RAILWAY SPUR

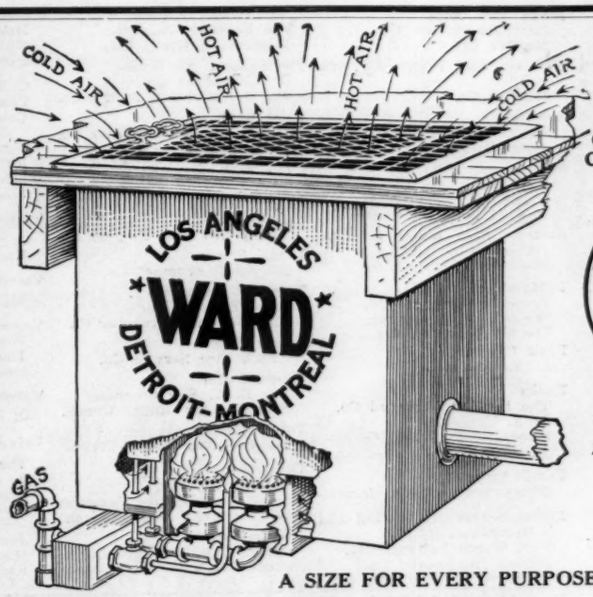
A railway spur for the loading of natural gasoline at the Barela station on the Colorado and Southern Railway is to be made for the Mountain States Gasoline Corporation. Cyrus W. Barnholt, president of the Colorado company, announces that another gas well will be drilled, making the seventh on the Barela structure. Gasoline storage tanks at the absorption plant of the company are filled to capacity.

GAS FOR TROUP IN 60 DAYS

The city council of Troup, Texas, has granted a gas franchise to the Dixie Gas & Fuel Company of Houston. Approximately 200 people of Troup have signed agreements to have their homes piped for gas. Assurance has been given by the Dixie Company that gas will be supplied the city in less than 60 days.

BAY CITY ADMITS GAS

A franchise to pipe and distribute natural gas to Bay City, Matagorda County, Texas, has been granted to the Houston Natural Gas Company. The gas will be supplied from the company's line from southwest Texas to Houston.



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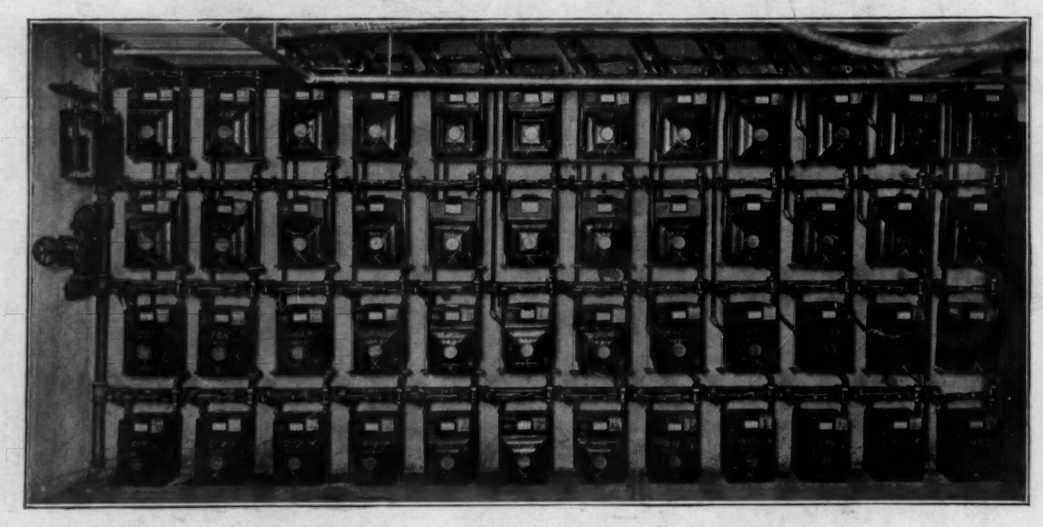

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